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Public Lands Operational Handbook

December 2004

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PREFACE

The *Alberta Public Lands Operational Handbook* applies to all industrial and commercial ventures on public lands, and will assist you in planning and conducting your operations. Objectives, standards and guidelines have been included for your use:

- **Objectives** — established set of environmental planning and operating targets or results the proponent is expected to achieve.
- **Standards** — the minimum accepted level that must be met or exceeded to ensure compliance with legislated requirements, established policy and environmental practises that are listed in this handbook.
- **Guidelines** — a set of suggested operating methods and practices used to achieve the objectives.

Planning is required as part of the approval process. Approval of surface disposition applications may be delayed if planning is insufficient, the information is inadequate, or there are other related deficiencies or unresolved problems. In some cases, the application must be amended which results in further delays.

Applicants may want to obtain copies of legislation listed in this handbook, and become familiar with the sections covering their activity. Copies of the legislation are available at the Queen's Printer in Edmonton and Calgary. Information on the provincial statutes and regulations is also available through the direct link to the Queen's Printer website at http://www.qp.gov.ab.ca/index.cfm.

This handbook does not supersede or replace existing legislation, regulations or disposition/approvals under the Public Lands Act or any other provincial or federal Act or Regulation. Current legislation and regulations take precedence over the handbook in all situations.

This handbook replaces the following resource documents:

- A Method of Impact Assessment at Point Sources,
- Culvert Sizing for Stream Crossings,
- Erosion Potential Index,
- Predisturbance Watershed Assessment,
- Resource Road Planning Guidelines,
- Stream Crossing Guidelines, and
- The Resource Handbook.

The applicant is responsible and accountable for implementing appropriate environmental practices, and for undertaking activities in accordance with this handbook and any operating conditions. Innovative approaches are encouraged, provided they are in accordance with the relevant legislation, policies, and meet the intent and spirit of this handbook. Should you have any questions on any part of this handbook, contact the Public Lands and Forests Division of SRD. For operational issues, contact the Land Manager at the nearest field office.

Objectives and Principles of the Handbook

OBJECTIVES

- Minimize and manage the impacts of commercial/industrial activities on natural resources.
- Minimize and manage the impacts of construction/development on public land containing surface material resources.
- Minimize hazards to the environment and any damage resulting from operating activities.
- Streamline application submissions through sound operational planning.

PRINCIPLES

Proponents will:

1. Conduct exploration, development and reclamation operations in a manner consistent with established departmental objectives, standards, policies, and guidelines for public lands.
2. Evaluate implementation of the operating guidelines when planning exploration, development and reclamation operations, and in developing mitigation programs.
3. Ensure the standards contained in this handbook are implemented appropriately during the life of the activity.
4. Identify and mitigate environmental impacts related to the activity.
5. Reclaim all surface disturbances to meet departmental standards.

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1.0 REGULATORY FRAMEWORK

1.1 ADMINISTRATION/MANAGEMENT OF PUBLIC LANDS

Provincial public land (land of the Crown in the right of Alberta), and natural resources (e.g., fish, wildlife, water) are managed by the Alberta government. Alberta Sustainable Resource Development (SRD) is responsible for managing Alberta's public lands (including surface material resources). Freshwater resources are managed and regulated by Alberta Environment (AENV), while Alberta Community Development (ACD) manages the provincial parks and protected areas in the province.

Approximately 60 percent of the provincial land base is public land. SRD uses an integrated resource and land management philosophy to manage the land for multiple uses, including watershed protection, recreation, water, fish and wildlife, grazing, forestry, and industrial development. The success of this approach depends largely on the commitment of resource users and Land/Resource Managers to sustain the natural resources.

1.1.1 Green and White Areas

GREEN AREA

Public land in Alberta is divided into two broad land use designations referred to as the Green Area and White Area. The Green Area contains forested lands that are not available for agricultural development other than grazing. Most of this area is located in northern Alberta, with the remainder in the mountains and foothills along the western boundary of the province. Public land in the Green Area is generally not available for sale or settlement.

Depending on the location, a number of uses may be permitted (e.g., timber production, oil and gas exploration and development, mineral and surface materials exploration and development, commercial ventures such as trail riding operations, and recreation). Natural gas in coal, which is also called coalbed methane (CBM) is treated in a similar fashion to conventional natural gas and development may be permitted in some areas. Specific land management guidelines have been developed for the Green Area to ensure proper use of the land and resources.

WHITE AREA

The White Area contains most of the land suitable for cultivating. Although much of this land is privately owned, the provincial government has retained a few parcels for environmental reasons or natural resources management. A wide range of uses is allowed on this land (e.g., agriculture, oil/gas/coalbed methane exploration and development, surface materials development, commercial ventures such as hotels and trail riding operations, and recreation). Specific land management guidelines have been developed for multiple use of this land base.

1.2 LAND/RESOURCE MANAGER AND LAND ADMINISTRATOR ROLES

Planning is part of land management. As part of planning, the Land and Resource Managers may identify a wide range of interests in the land. Information is then gathered and reviewed to evaluate land management options, and identify the objectives for managing the land.

RESOURCE MANAGER

The Resource Manager (e.g., fisheries, wildlife, timber, range, water, etc.) is responsible for managing the resource, and provides recommendations to the Land Manager based on technical and scientific information.

LAND MANAGER

The Land Manager is responsible for managing public lands, which includes integrating all resource uses (e.g., agricultural use and oil/gas development, etc.) on the land. This person also ensures the proponent complies with the terms and conditions on the disposition or approval issued under the *Public Lands Act*. Some Land Managers are also appointed as Conservation and Reclamation Inspectors to administer the conservation and reclamation requirements under the *Environmental Protection and Enhancement Act* (*EPEA*).

The Land Manager makes decisions/recommendations for managing the land and surface resources based on information provided by the Resource Manager, Land Administrator, and other sources. The recommendations are then submitted to the Land Administrator, Public Lands and Forests Division (PLFD).

LAND ADMINISTRATOR

The Land Administrator handles the ownership of public lands, land exchanges, assignments and land sales. The position also issues the disposition under the *Public Lands Act*, based on the Land Manager's recommendations, and ensures there is consistency with departmental policy and legislation. (See http://www3.gov.ab.ca/srd/land/fp_managing.html for the direct link to the Public Land website.)

1.3 ACQUIRING SURFACE RIGHTS ON PUBLIC LANDS

Surface access to occupied public land requires consent from the landholder/leaseholder. An approval from PLFD is required for most uses of non-occupied public land.

After negotiating consent for access to public lands under disposition (excluding sale agreements), a copy of the consent agreement must be sent to PLFD before a disposition will be issued. On public lands under sale agreement, a copy of the private surface agreement that has been negotiated with the disposition holder must be submitted to PLFD for prior approval of the agreement.

Forest management agreement (FMA) holders are occupants of public land based on the terms of their agreements. Before a disposition will be issued within the agreement area, consent must be obtained from the FMA holder and a copy submitted to PLFD.

Legal surveyors (under the *Surveys Act*) can enter onto any land to conduct a legal survey, provided they have made every effort to notify the owner or occupant. They are liable for any damages the survey may cause to the land or improvements, and must pay compensation to the owner/occupant.

1.4 DISTURBANCE OF BED AND SHORE OF WATERBODIES

Under the *Public Lands Act,* the Alberta government owns the beds and shores of most permanent naturally occurring rivers, streams, watercourses, lakes and other waterbodies in the province. If the proposed activity involves disturbing the bed and shore of a waterbody, regardless of whether the bed and shore are Crown-owned, an approval is required under the *Water Act*.

A Licence of Occupation (LOC) is required under the *Public Lands Act* to build any structures that could have a negative impact on the bed and shore of a waterbody (e.g., retaining walls, boat launching facilities, breakwater structures, causeways). If the activity may disturb the bed and shore of a waterbody, or result in the diversion and/or use of water, an approval may also be required from AENV under the *Water Act/Regulations* and any pertinent codes of practice. Similar approval may be required under federal government legislation (e.g., *Navigable Waters Protection Act* or *Fisheries Act*).

For more information on Crown-owned bed and shores and the necessary approvals, contact your nearest SRD Area office. A pamphlet entitled *Guidelines for Lakeshore Use* is also available from Area offices.

2.0 PREDISTURBANCE PLANNING FRAMEWORK

OBJECTIVE

Develop a comprehensive plan for an industrial/commercial project that will:

- Address all aspects of development, construction and use of the site.
- Address all legislative and policy requirements that will minimize the impact of the project on the environment and natural resources.

2.1 PREDISTURBANCE PLANNING

Predisturbance planning involves a number of steps. Depending on the location desired, there may be various regional, local and site-specific requirements for the area. These include determining the status of the land—is it vacant or under lease, are there any reservations or notations on the parcel, etc. The easiest way to gather most of the necessary initial information is to obtain a public land standing through the Land Status Automated System (LSAS) at the Calgary Information Centre (Phone: 403-297-6324), or establish an electronic transfer system account through the Department of Energy at www.energy.gov.ab.ca.

On occupied public land, written consent must be obtained from the landholder/leaseholder prior to initiating a project. Approvals from municipal and provincial agencies are also required. Before any detailed planning can occur, all factors that affect the land parcel should be identified. In some cases, the land may not be available for the intended purpose. Regional and local policies, plans, programs and legislation are available that provide information on some restrictions or requirements for specific areas (see Appendix 3). The Land Manager can also be contacted for clarification.

In addition to the application, one or more reports must also be submitted. The reports depend on the location and project, and may include an Environmental Field Report (EFR), an Area Operating Agreement (AOA), or a Geophysical Field Report (GFR). When completed, the application package is then submitted to PLFD in Edmonton.

If some or all of the project is on occupied land in the White Area, written consent for access must be obtained from the landowner or leaseholder before a disposition will be issued. In some cases, land required for a pipeline or road may be withdrawn from an existing disposition; however, this requires written consent from the disposition holder.

2.1.1 Route Selection and Alignment Process

For major proposed linear developments (i.e., longer than 2 km), the three-phase planning process must be completed and clarification provided on how the three phases were used. The three-phase route selection and alignment planning process should be implemented early in the planning stage before application is made for a disposition.

The advantages and disadvantages of various route selection alternatives must be clarified. Reasons must also be given for selecting a particular route. and the potential impacts that will require mitigation need to be identified. Land Manager approval or an agreement in principle

should be obtained for phases I and II before proceeding to phase III. Phase III is submitted as part of the EFR that accompanies the application submission.

For minor proposed linear developments (e.g., roads, pipelines or power lines between wellsites), the same basic process is followed, although less formally, with an explanation included in the EFR.

2.2 ROUTE SELECTION

Following a three-phase route selection and alignment planning process will result in a more comprehensive proposal that may better address the concerns of various special interest groups, government review agencies, landowners and others.

PHASE I — CORRIDOR SELECTION (REGIONAL AND LOCAL PLANNING ELEMENTS)

Use the regional and local planning elements to locate, evaluate and select a linear corridor/alignment.

Steps

1. Identify area affected by the proposed linear development.
2. Compile, evaluate and analyse the data (regional and local planning elements).
3. Identify all linear corridor/alignment options within the area.
4. Identify all impacts along each corridor/alignment option.
5. Evaluate environmental impacts for each corridor/alignment.
6. Rank corridors/alignments according to environmental impacts (lowest to highest).
7. Select the preferred corridor/alignment option.

PHASE II — ROUTE SELECTION (LOCAL PLANNING ELEMENTS)

Use the local planning elements to locate, evaluate and select a linear route within the preferred corridor.

Steps

1. Evaluate and analyze all the data (local planning elements) within the preferred corridor.
2. Identify route selection options within the preferred corridor/alignment.
3. Evaluate environmental impacts for each route/alignment.
4. Rank routes/alignment according to environmental impact (lowest to highest).
5. Select preferred route/alignment option.

PHASE III — SITE-SPECIFIC EVALUATION OF PREFERRED ROUTE/ALIGNMENT (SITE-SPECIFIC PLANNING ELEMENTS)

Use site-specific planning elements to evaluate and locate the centre line survey for the preferred route/alignment.

Steps

1. Locate landforms, watersheds, waterbodies, watercourses and other physical features that are to be avoided, or for which the effects of proposed activities must be minimized or mitigated.
2. Locate critical wildlife habitats, fisheries habitats, timber resources and other such features that are to be avoided, or for which the effects of proposed activities must be minimized or mitigated.
3. Complete technical site evaluation (e.g., geo-technical soil testing, hydrological surveys).
4. Identify potential impacts on other lands.
5. Locate and survey the route.

2.3 PREDISTURBANCE PLANNING PROCESS

STEP 1. DETERMINE LAND OWNERSHIP

Before proceeding with the proposal, the surface rights to the land must be obtained. The two main options for determining ownership of the land are:

1. Do a title search through the Land Titles Office (LTO). Untitled lands will not be listed, and may be provincial public lands or federal lands; *and/or*
2. Obtain a public land standing through LSAS to determine if the public land parcel is occupied (under disposition or reservation) or vacant. The public land standing will also identify the disposition type, status, name of the disposition holder, restrictions (e.g., reservations and notations), and provide a legal description of the lands under disposition.

If the land is not administered by SRD, the public land standing will indicate whether the land is private or if it has been sold, exchanged, or transferred to another provincial government department or to the federal government. If the public land is vacant, unoccupied (no dispositions), or consent of the disposition holder can be obtained, the land may be available for the proposed use if the applicant satisfies all the planning elements and meets all the requirements.

To obtain further information on LSAS, or for a search of the system, contact:

Calgary Information Centre
Alberta Energy
Suite 300, 801–6th Ave. SW
Monenco Place
Calgary, AB T2P 3W2

Telephone: 403-297-6324
Fax: 403-297-2576
e-mail: infocentre.energy@gov.ab.ca

Titled Land

If the land is titled, a search of the land titles records must be done through one of the private registries in Alberta. A copy of the certificate of title can be obtained for the land in question. Land may be titled to a government department for a specific purpose, such as a water management project.

Federal Crown Land

This land includes national parks, Indian reserves, and military bases and installations. To obtain information on specific federal lands, contact the appropriate federal government department or Crown Corporation.

Provincial Public Lands

Public lands are administered through legislation. Most public land is administered by SRD; however, four other departments or groups have a significant public land base. These are listed below.

- **Alberta Community Development (ACD)**

  The Parks and Protected Areas Division of ACD administers provincial parks, wildland provincial parks and provincial recreation areas (under the *Provincial Parks Act*); wilderness areas, ecological reserves, natural areas and heritage rangeland natural areas (under the *Wilderness Areas, Ecological Reserves and Natural Areas Act*); and Willmore Wilderness Park (under the *Willmore Wilderness Park Act*). Any authority to occupy or use these lands must come from the Parks and Protected Areas Division.

  Industrial activity is prohibited in the Willmore Wilderness Park, wilderness areas and ecological reserves. In wildland provincial parks, provincial parks, and most provincial recreation areas and natural areas, industrial activity is limited to commitments that existed prior to designation. Land use in provincial parks, wildland provincial parks and recreation areas is managed under the *Provincial Parks Act*.

  The Public Lands and Forests Division of SRD issues the dispositions for natural areas once the Parks and Protected Areas Division makes the land use decisions. Existing commitments to tenure holders are honoured, but new industrial dispositions are granted with a "no surface access" addendum. Additional information about permitted and prohibited activities in parks and protected areas may be obtained from the Parks and Protected Areas Division of Community Development.

- **Special Areas Board**

  Public lands within Special Areas are administered by the Special Areas Board. Authority to occupy and use these lands comes from the Board, with the exception of geophysical and metallic and industrial minerals exploration, which are under the mandate of SRD.

- **Municipal Affairs and Local Municipalities**

  Alberta Municipal Affairs and local municipalities administer public lands for municipal purposes. Any authority to occupy or use these lands must come from the agency that administers them.

- **Transportation**
  Alberta Transportation administers all surveyed road allowances (e.g., highways). Through memorandums of understanding, the department has delegated administration of other roads to the municipalities.

STEP 2. OCCUPIED PUBLIC LAND

- **Consent** — if the desired lands are occupied or under disposition (e.g., mineral surface lease, licence of occupation), reservation, or are within an FMA, written consent is required. "Consent" is defined as any approval, agreement, right-of-way or formal acceptance by the controlling party (e.g., disposition or DRS holder), or clearance from the agency that has a reservation on the land.

- **Approval** — An approval from Alberta Transportation or the municipality for proposed access approaches to highways/municipal roads should be obtained in advance. Failure to do so may result in delays or rejection of an application. Approval (in addition to consent) may also be required to cross other linear dispositions, such as pipelines, where specific crossing instructions and/or construction techniques must be met.

- **Resolution/Mitigation** — Obtaining consent may require negotiations and/or specific activities or concessions. If resolution or mitigation is not possible, the proponent may need to redefine the land requirements for the proposal and re-start the process. In some cases, formal or informal dispute resolution mechanisms are in place that can be used.

- **Other Legislative Requirements** — the proponent should investigate whether there are other legislative requirements outside the *Public Lands Act* that may have to be addressed regarding the proposed use of the public land parcel.

STEP 3. PROCEEDING WITH REGIONAL AND LOCAL PLANNING

- **Regional Planning** — If the required public lands are either unoccupied or consent has been obtained, and any additional approvals have been granted, the proponent's next step is to review all relevant regional planning documents to determine if there are any obstacles facing the proposed development. If possible, this should occur **before** selecting the specific site. If the intended purpose is not compatible with the uses allowed for the land, or development is not feasible for various reasons, another location may need to be found.

  The necessary information on regional planning issues that may affect the proposal should be gathered. If clarification is required, the Land Manager may be consulted. The proponent can also consult with the Resource Manager (e.g., Fish and Wildlife staff) on any resource issues at the regional planning level.

  If there are no regional planning restrictions or limitations to the proposed activity, planning at the local level can be started. If restrictions or limitations exist, the proposal may need to be revised to resolve or mitigate the concern. If the concern remains, no further action can be taken other than redefining and re-evaluating the land requirements for the proposal and re-starting the process. If the concern is resolved or mitigated, planning at the local level can begin.

- **Local Planning** — Essential information at the local level must be gathered. The proponent needs to investigate possible resource, landscape, topography and seasonal issues, along with existing infrastructure, other resource user needs, and habitation in the general area of the planned activity. If clarification is required, the Land Manager may be consulted. The proponent can also consult with the Resource Manager (e.g., Fish and Wildlife staff) regarding any resource issues at this level.

  If there are no local planning conflicts, planning at the site-specific level may begin. If local planning restrictions or limitations exist, the proposal may need to be revised to resolve or mitigate the concern. If the concern remains, no further action can be taken other than redefining and re-evaluating the land requirements for the proposal and re-starting the process. If the concern is resolved or mitigated, site-specific planning can begin.

STEP 4. SITE-SPECIFIC PLANNING

- **Information Gathering** — Site-specific planning focuses on the actual activity site, the specifics of the disposition application, and the implications for an EFR, AOA, or GFR. Operational and economic factors that may affect the proposal/disposition will also be evaluated and concluded at this level. The specific elements that apply to the proposed site must be determined, and the planning elements in the application must be addressed.

  The proponent must initiate site-specific planning and obtain the necessary information. If clarification is required, the Land Manager may be consulted. The proponent can also consult with the Resource Manager (e.g., Fish and Wildlife staff) regarding any resource issues at this level.

- **Site Survey** — in most cases, the specific site must be surveyed to determine the public lands that are required for the proposed activity. The survey should include all required clearings (e.g., borrow pits, work space, campsites). Specific survey requirements can be obtained from PLFD.

STEP 5. REPORTS TO ACCOMPANY THE APPLICATION

- **AOA or EFR** — The acquired information should be evaluated for inclusion into the Environmental Field Report (EFR) as part of the surface disposition application. An Area Operating Agreement (AOA) can be used if extensive oil and gas activity is proposed and multiple applications will be necessary. To determine whether an AOA or EFR is more suitable, the proponent must contact the SRD Area office.

  If an AOA is not approved, an EFR must be submitted with the surface disposition application. Instructions for submitting the EFR, EFR supplements and AOA information are available on the Public Lands Division website: http://www3.gov.ab.ca/srd/land/fp_managing.html by selecting "Publications/Forms" and then "Industrial".

  If an AOA is approved, a preliminary draft AOA is submitted to the SRD Area office, where it is reviewed and returned to the proponent for any necessary changes. A final AOA is then submitted to the SRD Area office and the Dispositions and Technical Services Branch (DTSB) in Edmonton.

- **EFR** — All surface disposition applications must be accompanied by an EFR, complete with the appropriate supplement(s).

- **GFR** — If oil/gas exploration is planned, a GFR must be submitted as part of the application. The GFR forms and submission guidelines are available on the Public Lands and Forests Division website at http://www3.gov.ab.ca/srd/land/fp_managing.html by selecting "Publications/Forms" and then "Exploration".

STEP 6. APPLICATION SUBMISSION

Once the application is completed and the entire submission is prepared, including the accompanying reports, the package is submitted to the Public Lands and Forests Division at the following address:

Public Lands and Forests Division
Alberta Sustainable Resource Development
2nd Floor, South Petroleum Plaza
9915-108 Street
Edmonton, AB T5K 2G8

Phone: 780-427-3570
Fax: 780-422-1269

3.0 FISHERIES AND WILDLIFE

3.1 FISHERIES

The amount and variability of aquatic habitat types should be retained where possible, and reflect natural pre-disturbance conditions. This will help to maintain fish species presence and diversity. The proponent needs to identify fish species and their habitats in the project area, and make every effort to maintain their productive capacity.

OBJECTIVES

Fisheries requirements, including habitat, must be considered during all phases of planning/development:

- Identify fish species (or species groups) and associated habitats that may be impacted by the activity.
- Avoid, or minimize and mitigate the following:
  - activities leading to erosion, stream sedimentation, nutrient loading or fish contamination,
  - removal or alteration of streambank and riparian vegetation,
  - activities that adversely affect or alter waterbody levels and watercourse flows, and
  - cumulative impacts to fish and aquatic habitats from combined land uses.
- Avoid, or minimize and mitigate, or compensate for, any adverse effects on fisheries habitat to ensure the productive capacity is maintained (no net loss of productive fish habitat).
- Avoid construction in any watercourse/waterbody. If construction is necessary, minimize the amount and how long it takes.
- Do not deposit any harmful substances in a watercourse or waterbody, or where such material can enter the watercourse/waterbody, including through seepage.
- Maintain acceptable fish passage and migration.
- Minimize the potential for transferring or introducing non-indigenous or undesirable species and organisms.
- Minimize roadside runoff and erosion, and avoid introducing sediment into watercourses and waterbodies.

STANDARDS

1. Conservation and management of water, including water allocation and use, and the protection of fish habitat and the aquatic environment, must follow the *Water Act* and its regulation. Licences are issued under the *Water Act* for diverting and using water, and approvals are required for activities that are not exempt under the *Water Act*/regulation, or regulated by a code of practice.

   (a) *Code of Practice* for *Pipelines and Telecommunication Lines Crossing a Water Body* — states the requirements for constructing a pipeline or telecommunication line across a watercourse or waterbody.

(b) *Code of Practice for Watercourse Crossings* — states the requirements for watercourse crossings that are not exempt under the Water Act and its regulation.

(c) *Codes of Practice for Temporary Diversion of Water for Hydrostatic Testing of Pipelines* — states the requirements for temporary diversion of water for hydrostatic testing of pipelines.

2. Watercourse crossings that do not require an approval under the *Water Act* or its regulation, or which are not regulated by the *Code of Practice for Watercourse Crossings*, must follow the *Alberta Timber Harvest Planning and Operating Ground Rules* or *Forest Management Agreement Timber Planning and Operating Ground Rules* (where applicable), and/or the terms and conditions of the dispositions/authorizations issued under the *Public Lands Act* and *Exploration Regulation*.

3. Fish and fish habitat on public land must be protected in accordance with the dispositions and authorizations issued under the *Public Lands Act*, *Exploration Regulation* and *Forests Act*.

4. Timber harvesting operations must include measures to protect fish and fish habitat, as directed in the *Alberta Timber Harvest Planning and Operating Ground Rules* or *Forest Management Agreement Timber Planning and Operating Ground Rules* (where applicable), and any additional terms/conditions prescribed.

5. In addition to obtaining the appropriate licences, authorizations and approvals from SRD and Alberta Environment, the proponent must comply with federal legislation. Under the *Fisheries Act* (Canada):

   (a) it is prohibited to destroy fish by any means other than fishing, unless otherwise authorized;

   (b) fish passage cannot be hindered in any way;

   (c) work or other activities are prohibited that may result in the harmful alteration, disruption or destruction of fish habitat:

   - harmful substances must not enter water used by fish or be deposited in any place or under any conditions that can result in the substance entering the water, and
   - harming fish or fish habitat by adding any water that contains a substance in sufficient quantity/concentration that it would degrade a watercourse or waterbody, or by adding water that has been changed so that a watercourse or waterbody would be degraded.

3.1.1 Planning/Procedural Guideline Documents

Industrial or Commercial Activity

Industrial or commercial activity should be carried out using the procedures and guidelines in the following documents. Additional references are listed in Appendix 4.

- *Fisheries Habitat Protection Guidelines* (Fish and Wildlife Division) — general procedures for planning and carrying out industrial activities in and around fish-bearing watercourses and waterbodies.

- *Watercourse Crossings* (2nd edition) — options for planning, approval, construction, maintenance and operation of energy pipelines in consideration of fisheries resources and habitats.
- *Fish Habitat Manual: Guidelines and Procedures for Watercourse Crossings in Alberta (1999)* — procedures for planning, designing and constructing watercourse crossings to minimize negative impacts on fish habitat and provide for fish passage. (www.trans.gov.ab.ca/Content/docType123/Production/fishhabitatmanual.htm.)

Water Quality and Waste

Handling water quality and waste should be carried out using the guidelines under *EPEA:*

- *Surface Water Quality Guidelines for Use in Alberta* — general guidance in evaluating surface water quality throughout Alberta; also used in setting water quality approval limits for wastewater discharges.
- *Alberta Water Quality Guideline for the Protection of Freshwater Aquatic Life in Alberta: Dissolved Oxygen.*
- *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems.*
- *Alberta Coal Mining Waste Water Guidelines* — general guidance on coal mine waste management, including settling pond design, using wastewater treatment chemicals and *EPEA* requirements for release limits, monitoring and reporting.
- *Wastewater Management Guidelines for Alberta Sand and Gravel Operations* — defines acceptable levels of control and performance for the sand and gravel industry in wastewater management.

3.1.2 Identify Fish Species/Associated Habitats of Management Concern

Fish species and associated habitats (including habitat types) must be identified in the area potentially affected by the proposed activity (http://www.gov.ab.ca/env/fw/fishing/fishstat.html). Consideration should be given to the following:

- **Sensitive species** — species such as arctic grayling and bull trout that are known to be particularly sensitive to the effects of industrial land use activities (e.g., sedimentation).
- **Species of management concern** — fish classified as species at serious risk, threatened with extirpation (COSEWIC), vulnerable species or species of special concern.
- **Species of domestic, recreational and commercial importance** — species used for sport fishing, commercial fishing, and for food by Alberta's Aboriginal people.

3.1.3 Fish Habitat, Passage and Migration

Land use and reclamation activities should be designed to maintain the full range of natural variability in the types and characteristics of aquatic habitats that existed before disturbance. Special consideration should be given to retaining the amount and variability of habitat types to reflect natural pre-disturbance conditions.

The adverse effects of disturbance to fish species and associated habits are to be minimized or mitigated, and the habitat restored or compensated for, as follows:

- **No net loss of the productive capacity of fish habitat** — *A Fish Conservation Strategy for Alberta, 2000–2005.* Development plans and activities are to include appropriate habitat protection, mitigation and restoration or compensation measures.
- **Achieve a net gain of habitat for Canada's fisheries resources** — *Policy for the Management of Fish Habitat.* Based on the principle of no net loss of fish habitats, DFO strives to balance habitat losses with habitat replacement through fish habitat projects.
- **Meeting fish passage standards** — *Alberta Infrastructure, Fish Habitat Manual: Guidelines and Procedures for Watercourse Crossings in Alberta* (1999). To meet fish passage standards, construction design needs to consider the species, the size of fish at maturity, the timing of migration and typical stream flow conditions at the time of migration. Since juvenile fish are weaker swimmers, special consideration may be required to ensure their passage and migration.

3.1.4 Transfer or Introduction of Non-indigenous Species

Significant negative long-term effects can occur to native species and their habitats when non-indigenous species or undesirable organisms are transferred or introduced into aquatic environments. Of particular concern are non-indigenous terrestrial and aquatic plants, and parasitic organisms such as Whirling Disease.

Before entering a waterbody or the area next to it, ensure that any equipment to be used in or near the water is clean and free of all mud and dirt. After the in-water construction phase is finished, wash the equipment again before it leaves that location.

3.1.5 Cumulative Effects

When several different land use activities occur within an area or watershed over a period of time, they have a significant cumulative effect on the numbers and distribution of certain fish species. Coldwater species are at particular risk, since they depend on an adequate flow of relatively clear, well-oxygenated water and silt-free substrate. To minimize this problem, land use access development and disturbances should be grouped, where possible, so they occur within a relatively limited amount of time and affect a minimal amount of land/water (roads and utility corridors, etc.).

Critical thresholds for fish species should be identified and avoided with respect to cumulative land use disturbances that may seriously affect the ecological integrity of aquatic environments. Guidelines for minimizing the cumulative effects of land use activities within a watershed include:

- limiting the number of watercourse crossings,
- limiting the amount of linear development , and
- minimizing the removal of terrestrial vegetation, and maintaining a minimum of 70% forest cover within the catchment areas of a forested watershed where possible.

3.1.5 Access

All access should be developed and managed to maintain the quality of the existing fisheries. Measures should be taken to minimize roadside runoff and erosion, and introducing sediment into watercourses and waterbodies. Access management should be used on new access routes to regulate or control human traffic (e.g., gating, rollback, seasonal use restrictions, etc.).

Protecting the aquatic environment means that routes must be carefully considered before a selection is made. The aquatic impacts should be thoroughly reviewed, and appropriate up-to-date maps should be used in route selection.

3.1.6 Exploration Activities, Wellsites and Pipelines

The *Fisheries Habitat Protection Guideline No. 1* provides guidelines for exploration (geophysical) activities where they cross or affect fish-bearing waterbodies and watercourses. *Fisheries Habitat Protection Guideline No. 2* contains guidelines for wellsite development where fish-bearing waterbodies and watercourses may be affected. Additional requirements are described in the *Policy and Procedures Document for Submitting the Geophysical Field Report Form* (PPD). The aquatic impacts should be thoroughly reviewed, and current maps used in route selection.

3.1.7 Surface Materials Extraction

Aggregate materials (sand and gravel) should not be removed from an active channel of watercourses containing fish. Such extraction is harmful to the aquatic environment. *Fisheries Habitat Protection Guideline No. 5* contains guidelines for removing sand and gravel associated with watercourses.

Proponents should contact the following federal offices for more information:

- Department of Fisheries and Oceans offices in Alberta:
  Calgary office — 7646-8th Street NE, Calgary, AB, T2E 8X4. General Inquiries (403) 292-5160, Fax (403) 292-5173.

  Edmonton office — Whitemud Business Park, 4253-97 Street, Edmonton, AB, T6E 5Y7 for general inquiries (780) 495-4220, Fax (780) 495-8606. For information on the Navigable Waters Protection Act, phone (780) 495-3701.

  Lethbridge office — J. D. Higenbotham Building, Suite 204, 704 – 4th Ave., Lethbridge, AB, T1J 0N8, AB, General Inquiries (403) 394 –2920, Fax (403) 394-2917.

  Peace River office, 9001-94 Street, Peace River, AB, T8S 1G9, General Inquires (780) 618-3220, Fax (780) 618-3235.

- National Energy Board, 311 Sixth Avenue, S.W., Calgary, Alberta, T2P 3H2 (regarding inter-provincial pipelines).

3.2 WILDLIFE

To protect wildlife/habitat on public lands, the proponent must follow the terms and conditions of the dispositions/authorizations issued for the activity. In forested areas, additional requirements are provided in the *Alberta Timber Harvest Planning and Operating Ground Rules* and/or *Forest Management Agreement Timber Planning and Operating Ground Rules*, or by any additional terms/conditions prescribed.

OBJECTIVES

Wildlife requirements, including habitat, must be considered during all phases of planning/development:

- Identify wildlife species, associated plant communities and habitats that may be affected by the activity.
- Avoid, or minimize and mitigate the following:
  - disturbance to wildlife species and plant communities of management concern and their associated habitats,
  - any significant changes to the natural range of plant and animal species diversity and their supporting environments,
  - significant changes to species distribution, both regionally and provincially,
  - losses in useful habitat for wildlife species of management concern through increased access development, associated human travel and changes in land use patterns,
  - cumulative impacts of combined land uses on wildlife species and plant communities of management concern;
- Avoid transferring or introducing non-native or undesirable species and organisms to the site.
  - thoroughly clean operating equipment used in other locations before bringing it onsite. (Significant negative long-term effects can occur to native species and their habitats when non-indigenous species or undesirable organisms are transferred or introduced into the environment.)

STANDARDS

1. Wildlife dens or nests should not be destroyed or disturbed, particularly for endangered or at-risk species.
2. All restrictions for wildlife control areas and seasonal sanctuaries should be followed (i.e., surface access and specific types of activities that are restricted during specific times of the year).
3. All restrictions for surface access and specific types of activities within habitat conservation areas should be followed (see *Wildlife Act* and regulations, and associated management plans for individual habitat conservation areas).

3.2.1 Identify Wildlife Species/Associated Habitats of Management Concern

Land use guidelines have been developed for selected wildlife species and key wildlife areas (see *Recommended Wildlife Land Use Guidelines* at www3.gov.ab.ca/srd/fw/landuse/).

Wildlife species and associated habitats (including plant communities) must be identified in the area that will potentially be affected by the proposed activity. Consideration should be given to the following:

- **Sensitive species** — species that are particularly sensitive to, or intolerant of, industrial land use activities (e.g., grizzly bear, colonial nesting birds), or species that depend on unique or sensitive habitats (old growth forests/wetlands).
- **At risk species** — species that are at risk of permanent loss from the region or province. Refer to *The General Status of Alberta Wild Species* at www3.gov.ab.ca/srd/fw/status/index.html. For general information on species at risk in Alberta, see www3.gov.ab.ca/srd/fw/riskspecies.html.
- **Rare species and plant communities** — species and communities that are rare at a regional or provincial level (e.g., northern fringed gentian).
- **Recreational species** — species of recreational importance (e.g., species that are hunted and/or popular for viewing/photography).
- **Economic species** — species of economic importance (e.g., fur-bearing species that are trapped and game species that are hunted with the aid of licensed guides and outfitters).

3.2.2 Disturbance/Access

Disturbance should be minimized for species and plant communities of management concern, as well as their associated habitats, particularly:

- during key/sensitive times of the year when species are reproducing, rearing young, migrating or wintering;
- in key/sensitive locations, habitats and habitat structures that support species for reproduction, rearing young, thermal cover, feeding (including mineral licks), staging/resting and migration/seasonal movement;
- in established wildlife habitat management zones, seasonal sanctuaries and other critical use areas; and
- for special habitat features and structures that are particularly important, such as caves, large dead snags/logs, riparian zones, valley complexes and wetland areas.

The development of new access in an area should be minimized where possible. Access that is no longer needed should be closed. If new access is required, disruption of known high wildlife use areas and high-quality habitats should be minimized. The timing and type of access may be restricted depending on the location and wildlife species.

In situations involving species that are particularly sensitive, at risk or provincially rare, greater effort should be made to limit access development and all subsequent use of that access.

In northern Alberta, woodland caribou are of particular concern owing to negative impacts from roads and other linear developments. In some caribou areas, the timing of activities is regulated, and graded road development may not be approved.

3.2.3 Biodiversity

Land use and reclamation activities should be designed to maintain the full range of natural variability in plant and animal species at both the regional and provincial scales, as well as the species distributions. In addition, the type and characteristics of land cover types, including successional stages and age class distributions occurring before disturbance should also be maintained. The size and spatial arrangement of different cover types should be maintained to reflect somewhat natural pre-disturbance conditions.

Special consideration should be given to ensuring corridors or "stepping stones" of suitable habitat are retained as links between the core habitat areas. These are important in maintaining the biodiversity and natural features within landscapes that have been altered from their original condition.

3.2.4 Cumulative Effects

The occurrence of several different land use activities within an area or watershed can have a cumulative effect that reduces or eliminates the ability of an area to further support certain wildlife species. This is particularly true for species that depend on large, undisturbed patches of habitat, or species that are vulnerable to habitat fragmentation and related increase in predators and/or competing species (e.g., woodland caribou).

To minimize this problem, land use access development and disturbances should be grouped where possible, so they occur within a relatively limited amount of time and space, thereby reducing the amount of land under disposition. Critical thresholds for wildlife species should be identified and avoided, as they relate to cumulative land use disturbances that may seriously affect the wildlife and ecological integrity of an area.

4.0 SURFACE ACCESS MANAGEMENT

Specific policies, procedural and guideline documents should be consulted when developing access routes for a project. Surface access restrictions may be imposed in specific areas[2]. Completing the pre-disturbance planning at the regional, local and site-specific planning stages will help identify these restrictions.

Common corridors should be used before creating new access. Where this is not possible, the amount of new surface access should be minimized since it can have a negative impact on the environment and natural resources. Note that new access can result in conflicts with other users.

OBJECTIVES

Evaluate, plan, integrate and manage existing and proposed industrial/commercial surface access on public lands:

- Minimize any adverse impact on the environment and natural resources.
- Identify, minimize and mitigate any direct and indirect environmental impacts associated with the activity (e.g., linear disturbance).
- Use common corridors for various linear activities where possible.
- Meet requirements for safety of the public and industrial/commercial users.
- Avoid, or minimize and mitigate the following:
  - loss of useful habitat for fish and wildlife species of management concern through increased access development and associated human and predator travel patterns;
  - cumulative impacts of combined land uses on fish and aquatic habitats, wildlife species and plant communities of management concern;
  - activities leading to disturbance of natural drainage, erosion, stream sedimentation, nutrient loading or fish contamination.

STANDARDS

1. The necessary surface dispositions/authorizations required under the *Public Lands Act* and/or *Mines and Minerals Act* must be obtained.
2. Surface access development on public lands that is related to timber harvesting operations must be carried out in accordance with the *Forests Act* and *Timber Management Regulation*:
   (a) timber dispositions/approvals issued under the *Forests Act*,
   (b) where applicable, timber harvest operations must incorporate surface access management as required in the *Alberta Timber Harvest Planning and Operating*

[2] For restrictions on provincial public lands that are not covered under the *Public Lands Act* (e.g., Provincial Parks, Wilderness Areas, Special Areas Board), refer to Section 2.0, Predisturbance Planning Framework. Contact the agency that administers these public lands for information on any specific restrictions that may apply.

Ground Rules or *Forest Management Agreement Timber Planning and Operating Ground Rules*, and any additional terms or conditions prescribed.

3. All surface access restrictions must be followed for forested land within Forest Land Use Zones and Forest Recreation Areas (*Forest Recreation Act*).
4. All restrictions for wildlife control areas and seasonal sanctuaries must be followed (e.g., surface access and specific types of activities that are restricted during specific times of the year).
5. All restrictions for surface access and specific types of activities within habitat conservation areas should be followed (see *Wildlife Act* and regulations, and associated management plans for individual habitat conservation areas).
6. Where fire danger warrants, entry to any land may be closed (*Forest and Prairie Protection Act*).

4.1 PLANNING/PROCEDURAL GUIDELINE DOCUMENTS

Industrial or commercial activity should be carried out using the procedures and guidelines in the following documents. Additional references are listed in Appendix 4.

- *Procedure/Guidelines for Motorized-Access Management Policy on Industrial Dispositions/Vacant Public Land* (1993) — criteria for obtaining authority for road closures.
- Integrated Resource Plans (IRPs).
- Access Management Plans.
- *1996-97 Operating Guidelines for Industrial Activity in Caribou Ranges in West Central Alberta* — field operating procedures and requirements for industrial/commercial activity in caribou ranges.
- The following guidelines are currently used in the boreal area of Alberta:
  - *Operating Guidelines for Industrial Activity in Caribou Ranges in Northwest Alberta* (May 1996).
  - *1997-98 Interim Red Earth Caribou Operating Guidelines.*
  - *Caribou Protection Plan for Oil and Gas Activity on the Slave Lake Caribou Range* (Sept. 1993).
  - *Land Use Strategies for Industrial Activity in Key Caribou Areas of the Northeast Boreal Region for 1997/98.*

4.2 SURFACE ACCESS

4.2.1 New Surface Access

Existing access should be considered before creating new access routes. Some methods that will help reduce the need for new surface access include:

- use of common corridors,
- low impact seismic,

- remote operation of well sites,
- frozen ground access only.

Any new access that will affect an existing fisheries should be developed and managed to maintain the quality of the fisheries. (Note: The construction of new watercourse crossings in Class A waterbodies is prohibited under the *Water Act – Code of Practice for Watercourse Crossings*.)

4.2.2 Surface Access Control or Closure

Surface access closure may be allowed under specific circumstances if it meets the necessary criteria and is fully justified and substantiated. (Refer to the *Motorized Access Management Policy on Industrial Dispositions,* and *Procedure/Guidelines for Motorized-Access Management Policy on Industrial Dispositions/Vacant Public Land [1993].*)

Any new access must be managed to regulate or control human traffic (e.g., gating, rollback, seasonal use restrictions). The following are examples of access control or closure that may be used for roads and other types of access routes:

- rollback,
- manmade barriers (e.g., berms, ditches, and placement of ice, snow, posts, trees and large boulders),
- removal of structures from natural barriers (e.g., bridges, culverts),
- gates (manned and unmanned),
- signage,
- patrols.

5.0 TIMBER SALVAGE AND WOODY DEBRIS DISPOSAL

Timber salvage is a standard operating requirement for all industrial/commercial dispositions on forested public lands. A timber salvage plan must be approved or a waiver for timber salvage must be obtained before clearing operations can begin. The disposition holder is responsible for ensuring maximum salvage of merchantable timber. The local SRD Area office can be contacted for further details.

OBJECTIVES

Plan and conduct timber and woody debris disposal on public lands:

- Prevent soil, timber and woody debris from entering a watercourse or other waterbody.
- Protect the bed and banks, and the aquatic and terrestrial habitat of any watercourse or other waterbody.
- Maximize the recovery of all merchantable timber and minimize the loss of fibre.
- Minimize the adverse impacts on the environment and natural resources.
- Minimize the potential for soil erosion, and the amount and degree of soil disturbance.
- Minimize the potential for fire hazard.

STANDARDS

1. All timber salvage must be carried out in accordance with the *Timber Management Regulations* and, as applicable, the *Alberta Timber Harvest Planning and Operating Ground Rules* or *Forest Management Agreement Timber Planning and Operating Ground Rules*, and any additional terms and conditions prescribed.
2. All merchantable timber shall be salvaged using an approved "Timber Salvage Plan" unless the requirement is waived. The disposition holder must provide the Land Manager with either a "Timber Salvage Plan" or a "Request for Waiver", which must then be approved before construction can start.
3. Authorization to remove salvage must be obtained using SRD Form TM 88, or a company contract that has been signed by the disposition holder and salvage contractor with a copy submitted to the Land Manager. SRD Form TM 9 (Forest Products Hauling Record) is required to transport forest products.
4. Total or partial debris disposal must be carried out in accordance with the *Forest and Prairie Protection Regulations, Part II.*
5. A fire permit is required for any burning during fire season (*Forest and Prairie Protection Act*).

5.1 WOODY DEBRIS DISPOSAL

Debris disposal is primarily required to reduce fire hazard, and is carried out concurrently with operations. It may also be necessary to provide a better medium for vegetation regrowth, or for aesthetic reasons.

LICENCE OF OCCUPATION GUIDELINES

These guidelines apply to all roads on public lands. Generally, permanent roads require total disposal of slash and debris, while partial disposal is required for all temporary roads. The method of disposal may differ depending on the use and class of road.

TOTAL DISPOSAL

Total debris disposal involves the complete removal and disposal of trees and brush on the site by burning, with the residue spread over the disturbed areas. Any burning must be done at a safe time of year and under safe conditions to prevent the spread of fire and minimize smoke along roads. All fires must be completely extinguished. A fire permit must be obtained for all burning during the fire season (usually April 1 to Oct. 31). The disposition holder is responsible for knowing the dates of the current fire season and following the specific requirements.

PARTIAL DISPOSAL

Partial debris disposal entails altering the slash and woody debris on the site by manual cutting and using mechanical equipment/tools. It may involve burning a limited portion of woody debris. The disposal method depends on site-specific conditions and the type of disposition.

- **Windrowing** — forming linear piles of woody debris from land clearing operations. It is commonly used for seismic operations. (Refer to *Geophysical Guidelines* for standards.)
- **Rollback/Debris Spreading** — re-spreading woody debris from windrows and brush piles back over the site after the activity is completed. During site preparation, slash and debris may be pushed to the edge of the activity area or stored on approved sites. The slash and debris can then be spread on exposed cuts and fills and other exposed areas to prevent/minimize erosion and assist in vegetation recovery. The debris must lie flat to the ground to be effective for erosion control. The advantages of rollback/debris spreading are:
  - breaks up the slash windrow and spreads debris closer to the ground for faster decomposition;
  - controls erosion on steep slopes or other areas of high erosion potential;
  - promotes revegetation by providing microsites for seed germination;
  - restricts access into critical wildlife areas (must be specified by the Land Manager);
  - helps to contain/reduce the fire hazard in isolated areas (e.g., fires can generally be contained with minimal effort using hand tools, whereas considerable effort is required to break up windrows to prevent a fire from spreading);
  - provides an insulating layer to minimize permafrost melt. If the frozen organic material (duff and moss) is removed, the permafrost will melt, resulting in further loss of organic material and causing erosion channels to form;
  - may be spread over cut-and-fill slope areas as an interim measure to control soil erosion and promote revegetation when a site will be left dormant for a period of time (e.g., wellsite prepared but not drilled). This depends on other considerations such as fire hazard, erosion potential, type of activity, and how long before development will proceed.

- **Burning** — excessive amounts of woody debris may require some portion the windrows or brush piles to be burned. This is determined on a site-specific basis. Any burning must be done at a safe time of year and under safe conditions. All fires must be completely extinguished. A fire permit must be obtained for all burning during fire season.
- **Mechanical Methods** — the amount of slash may be reduced through the use of a mechanical chipper, rotary landbreaker or hydro-axe, or using heavy equipment to crush the slash.
- **Manual Cutting** — woody debris may be limbed, felled and bucked to minimize the fire hazard, help control erosion and promote decomposition.

6.0 SITE DISTURBANCE, CLEARING AND SOIL MANAGEMENT

6.1 SITE DISTURBANCE AND CLEARING

When an exploration or development project is undertaken, the proponent is responsible for minimizing the loss of timber and other forest vegetation. Poor clearing practices, inadequate timber salvage plans and inaccessible timber decks are examples of unacceptable timber management practices. In addition, unnecessary or indiscriminate clearing can increase the negative cumulative effect the project has on the environment.

From the outset, the proponent needs to consider the reclamation requirements, since the site will have to be reclaimed eventually. Unsatisfactory clearing can slow construction progress and create problems for reclamation. Erosion can occur where vegetation is removed, such as on steep slopes and sensitive soils. Heavy equipment use or log skidding over a watercourse without installing an acceptable crossing structure will damage the streambed and banks.

OBJECTIVES

Plan and conduct site development and clearing operations on public lands:

- Optimize the use of existing clearings through integration with other users.
- Promote the natural re-establishment of native plant species.
- Prevent soil, timber and woody debris from entering a watercourse or other body of water.
- Protect aquatic and terrestrial habitat, as well as the bed and banks of any watercourse or other body of water, and maintain its natural aesthetics.
- Minimize clearing and the potential for soil erosion.
- Minimize the waste of merchantable timber and loss of fibre.
- Minimize the amount and degree of soil disturbance, soil compaction and loss or mixing of topsoil.
- Minimize the risk of fire.
- Minimize and mitigate any adverse impact on the environment and natural resources.

STANDARDS

1. Forest growth cannot be cut, damaged or destroyed without authorization (*Forests Act*).
2. Timber clearing must be conducted in accordance with the *Timber Management Regulations* and, as applicable, the *Alberta Timber Harvest Planning and Operating Ground Rules* or *Forest Management Agreement Timber Planning and Operating Ground Rules* and any additional terms/conditions prescribed.
3. Fire prevention maintenance and clearing associated with an industrial/commercial operation must be carried out in accordance with the *Forest and Prairie Protection Regulation*.

4. Clearing within the approved and marked disposition boundaries must be limited to the area required for construction activities. Additional clearing outside the disposition boundaries must be approved by the Area Land Manager.
5. All on-site activities must follow the *Alberta Occupational Health and Safety Regulations*.

6.2 EXCAVATION/EXTRACTION AND SOIL MANAGEMENT

Care must be taken when removing topsoil, since it will be needed when the site is reclaimed. It is strongly recommended that appropriate soil removal techniques be planned before removal occurs. All surface soils must be salvaged and replaced on the site, and pre-planning ensures the integrity of the salvaged topsoil for future reclamation use. Specific requirements for fish habitat are provided in the federal *Fisheries Act*.

OBJECTIVES

Plan and carry out operations:

- Identify, and minimize and mitigate the direct and indirect environmental impacts associated with excavation/extraction activities, including erosion and sedimentation.
- Identify, inventory and manage surface material resources (topsoils and subsoils).
- Protect and preserve the integrity of the soil for reclamation purposes by minimizing soil disturbance, the loss or mixing of topsoil, and degree of soil compaction.
- Maximize resource use and minimize waste.
- Minimize and mitigate any adverse impact on the environment and natural resources.
- Minimize and mitigate visual impacts (e.g., create buffers) and impacts on other resources and adjoining interest holders.
- Prevent, or minimize and mitigate, soil migration and deposition of sediment to prevent adverse effects on the land and water.
- Prevent surface material, sediment, timber/woody debris from entering a watercourse or waterbody.
- Protect terrestrial and aquatic habitat, as well as the bed and shore/banks[2] of any watercourse or other waterbody, and maintain its natural aesthetics.
- Promote regeneration of native plant species, or appropriate agronomic species in agricultural areas.
- Ensure evaluation, planning and implementation of surface access management and habitat restoration or enhancement following excavation/extraction.
- Ensure there are no conflicts with mineral rights.

[2] The "bed and shores" of most permanent and naturally occurring waterbodies are owned by the province of Alberta under the *Public Lands Act*. The *Water Act* applies to waterbodies on public land or private land. The distinction between the "bed and shore" under the *Public Lands Act* and "waterbodies" (includes bed and banks) under the *Water Act* is important. It is suggested that you consult the *Public Lands Act* and the *Water Act* for clarification.

STANDARDS

1. Excavation and extraction on public lands shall be approved and conducted in accordance with the terms and conditions of dispositions/authorizations under the *Public Lands Act* and *Dispositions and Fees Regulation*, and shall follow the guidelines provided in "*A Guide to Surface Material Resource Extraction on Public Land*" (2000).
2. Excavation and extraction on public/private lands shall be conducted in accordance with the *Environmental Protection and Enhancement Act* and the *Conservation and Reclamation Regulation*.
3. Where permitted, removal of surface material from the bed of any lake, river or stream shall be in compliance with the *Water Act* and the *Public Lands Act*.
4. Excavation and extraction associated with timber harvest operations on public lands shall be in accordance with the *Forests Act* and *Timber Management Regulation*.
5. Development and use of surface materials (e.g., gravel pits and borrow pits) associated with timber harvest operations within the forested areas shall be in accordance with, as applicable, the *Alberta Timber Harvest Planning and Operating Ground Rules* or *Forest Management Agreement Timber Planning and Operating Ground Rules*, and any additional terms/conditions prescribed.
6. Clearing within the approved and marked disposition boundaries shall be limited to the area required for construction activities. Additional clearing outside the disposition boundaries must be approved by the Land Manager.
7. All approved surface material extraction shall be reported to the Public Lands Division by submitting Surface Material Operation Annual Returns (Form No. LM 17A). All extraction operations approved with a Conservation and Reclamation (C&R) Plan must include a C&R Annual Report.
8. Soil management on public lands must be carried out in accordance with the *Public Lands Act*, the *Soil Conservation Act*, and the *Environmental Protection and Enhancement Act*.
9. Erosion and sedimentation shall be prevented or controlled in accordance with the *Public Lands Act* or the *Forest and Prairie Protection Regulations, Part II*.
10. Soil management associated with geophysical operations must be carried out in accordance with authorizations issued under the *Exploration Regulation* and the *Metallic and Industrial Minerals Exploration Regulation*.
11. Soil management associated with timber harvesting operations within the forested areas must be conducted in accordance with the *Alberta Timber Harvest Planning and Operating Ground Rules* or *Forest Management Agreement Timber Planning and Operating Ground Rules*, and any additional terms/conditions prescribed.
12. Soil management operations must be in accordance with the *Weed Control Regulation* and any applicable municipal bylaws regarding weed control.

6.2.1 Planning/Procedural Guideline Documents

Carrying out excavation and extraction activities on public land is governed by a number of guideline and procedural documents. These are as follows:

- *A Guide to "Surface Material" Resource Extraction on Public Lands* — outlines the procedures for developing and reclaiming a surface material operation (except peat) on public lands.
- *Guide for Pits* — provides information on the approval process under *EPEA* and environmental protection guidelines for pits that do not require approval under *EPEA*.
- *Borrow Excavations* (C&R/IL/00-3, Alberta Environment) — describes the regulatory requirements for a new class of activities called borrow excavations. Under the new regulations, borrow excavations are treated differently than pits.
- *A Users Guide to Pit & Quarry Reclamation in Alberta* (Alberta Land Conservation Council, Reclamation Research Technical Advisory Committee, 1992) — outlines the requirements for public and private lands. It includes the basics of material extraction and processing, planning a pit or quarry operation from start-up to closure, and selecting the best land use or uses for the reclaimed site.
- *Wastewater Management Guidelines for Alberta Sand & Gravel Operations* (Alberta Environmental Protection, May 1980) — define acceptable levels of control and performance to be attained by the sand and gravel industrial sector with respect to wastewater management.

6.3 SITE CLEARING

Before clearing a site, review the following:

- Unless the area is to be grubbed, clear non-merchantable timber and treed muskegs (maximum stump height less than 10 cm) in a way that breaks the tree cleanly without pulling up the roots.
- Minimize the width of rights-of-way at shelterbelts and windbreaks.
- Do not pre-clear steep, erodible slopes unless construction will start immediately after clearing.
- Hand-clear erodible slopes that do not need to be graded.

6.3.1 Grubbing or Stripping

Grubbing involves mixing, removing and storing (stockpile or windrow) the mineral soil layer and organic duff layer (e.g., moss, leaf litter, grass mat and roots) from a site after clearing. Stripping involves removing and storing (stockpile or windrow) specific mineral soil layers from a site. Generally grubbing is undertaken only in forested areas. If the mineral soil layer is not removed completely during grubbing, additional stripping may be required and a second stockpile or windrow created.

The main difference between grubbing and stripping is the duff layer, which creates an excellent medium for reclamation when mixed with the mineral soil. The duff layer is usually mixed with

the mineral soil layer if a brush rake is used to remove and pile roots, stumps and other woody debris.

6.4 SETBACKS/BUFFER ZONES

Buffer zones vary in width depending on several factors, such as their purpose, height, age, type and density of timber making up the buffer, the slope of the landscape, and where the operation is located in relation to other operations, roads, watercourse/waterbodies and communities. Contact the Area Land Manager to obtain the specific setback requirements.

Setbacks and buffer zones are required for the following reasons:

- **Aesthetics** — a buffer helps to minimize or alleviate the negative visual impact generally associated with an operation or facility.
- **Air Quality** — vegetation buffers help to control the spread of dust.
- **Noise Abatement** — vegetation buffers help to absorb noise, thereby reducing its impact.
- **Erosion Control** — vegetation helps anchor the soil and retard wind and water erosion.
- **Wildlife Corridors** — buffers provide habitat and shelter for wildlife, which allows them to use the corridors and move from one core habitat area to another with minimum exposure.
- **Watercourse Protection** — buffers and setbacks help protect the integrity and quality of the watercourse and riparian areas for the public and various species of wildlife, and fish habitat by trapping sediment and nutrients, maintaining stream bank stability, and by maintaining unique vegetation and habitat features associated with riparian areas.
- **Line of Sight** — buffers minimize the line-of-sight from roads and operating areas, making it less hazardous for wildlife, particularly during the hunting season. Temporary access roads leading from public roads to areas of negative visual impact (e.g., borrow areas) should be doglegged or constructed at an angle to reduce the line-of-site and to screen the operation from the road.
- **Safety** — buffers create a natural barrier to discourage public access to hazardous sites and equipment.

6.4.1 Streambank and Riparian Vegetation

Streambank vegetation maintains the balance of a stream's ecology. If vegetation is removed, the following may occur:

- increased amount of solar radiation reaching the stream;
- greater amounts of sediment, nutrients, organic litter and woody debris entering the stream; and
- changes to the structure and design of the channel.

Any one of these changes affects the basic productivity level in the stream, changes the type and distribution of aquatic insects, and alters the structure and quality of fish habitat.

6.5 GUIDELINES FOR ROADS AND RIGHTS-OF-WAY

6.5.1 Field Layout of Roads for Clearing

Field layout is required for all roads. The precision of the layout depends on the type of road and the degree of engineering design.

- ***Permanent Roads*** — These roads must have the right-of-way boundary flagged or blazed before clearing occurs. The road must also be surveyed to establish a baseline and if necessary, the grade must be staked. Cuts and fills over 1.5 m should be staked. If additional land is needed to accommodate cuts and fills, approval must be obtained from the Land Manager.
- ***Temporary Roads*** — Before clearing, these roads should be surveyed (a legal survey is not required). The centerline should be marked or flagged, and the right-of-way edges should clearly be shown using flagging. Construction stakes are required only on critical sites.

6.5.2 Clearing Rights-of-Way

Clearing widths should be designed to meet the requirements for construction and safety, with only the amount of land cleared that is specifically required. Variable-width clearing of a right-of-way is more aesthetically pleasing, increases the edge effect and reduces the line-of-site to wildlife.

Variable-width clearing can be undertaken in several ways, including:

- reclaiming borrow pits located on the right-of-way;
- selectively cutting trees that are susceptible to blowdown;
- planning other selective cutting to enhance scenic views;
- through additional land requirements for slope grading and timber decking; or
- as a core part of the road design.

Clearing operations for grading and ditching that extend beyond the earthworks should be minimized. Approval from the Land Manager must be obtained if it is necessary to go beyond the approved disposition boundary for extra clearing (e.g., work space, increase in sight distance, topographical constraints or increased road exposure for drying).

6.6 SOIL MANAGEMENT

The *Forest Soil Conservation* (Alberta Forest Products Association/Land and Forest Service Task Force Report) addresses the potential impacts on forest soils. The proponent will find it useful in planning and making field assessments, and in guiding operational decisions.

A Guide to Surface Material Resource Extraction on Public Land provides directions for handling soil when conducting exploration activities and excavating surface materials (excluding peat). It also outlines the procedures that should be used for developing and reclaiming a surface material operation (except peat) on public lands.

6.6.1 Pre-Construction Site Planning

A soil survey should be completed before any disturbance to determine the appropriate soil handling techniques. To prevent soil degradation, the timing of soil salvage should be carefully considered and the equipment should be appropriate for the specific soil removal situation. Poor construction techniques can result in:

- soil compaction and rutting;
- mixing of soil horizons;
- loss of topsoil;
- wind/water erosion; and
- increased reclamation efforts (costs).

6.6.2 Soil Salvage

Soil salvage requires each individual soil horizon to be stripped. These horizons are referred to as "lifts" once they are removed. If the horizons are shallow (e.g., some forest soils), they may be combined in some cases to build a lift, which can then be used as a growth medium for reclaiming the disturbed site. The three soil salvage methods are as follows:

- **One-lift soil salvage** — commonly used in forested and muskeg areas. Muskeg or organic soils usually extend to a depth of 30–40cm. Forest soils are generally stripped down to 15cm, but many boreal forest soils have 20 to 30cm or greater A-horizons. Regardless of depth, the entire A-horizon of forest soils should be removed.
- **Two-lift soil salvage** — commonly used where agricultural activity dictates the soil handling techniques and soil horizons can be more easily recognized. The A-horizon is removed first, followed by the second lift B-horizon.
- **Three-lift salvage** — used primarily when there is a definite distinction in quality between the upper and lower subsoil horizons.

The two-lift salvage and the minimal soil disturbance method (below) are encouraged, as they increase the likelihood of retaining soil quality and meeting reclamation criteria.

6.6.3 Minimal Soil Disturbance

The minimal disturbance method reduces damage to slow-growing muskeg and native prairie vegetation. Muskeg sites can be stabilized by using textile mats and borrow material, or by saturating the site with water and allowing it to freeze down. On native prairie, minimal stripping should be used around wellhead and flare pit locations, and on the ditch line for pipeline installations.

6.6.4 Soil Storage

LOCATION AND SEGREGATION

Stripped soils must be stockpiled or windrowed on the edge of the clearing away from trees and active operations, or removed to an approved, secure area for long-term storage. Minimizing the distance that soil must be moved reduces the amount of soil loss. A soil management plan may

be required to identify acceptable soil storage locations. Any off-site storage must be approved by the Land Manager.

Soil horizons removed by a two or three-lift salvage operation must be piled separately, and the piles generally separated by at least 1 m. Care must be taken to ensure minimal admixing and soil loss when the site is reclaimed. To accommodate different soil lifts, small storage piles may need to be placed around the lease site.

FENCING

The disposition/approval may require construction of a fence around topsoil stockpiles to prevent them from being trampled by livestock while vegetation is being established. If the vegetative cover is damaged, the soil will be exposed to wind or water erosion.

6.6.5 Soil Compaction

The topsoil and subsoil horizons can become compacted through livestock use, heavy equipment and vehicle movement. Subsoil compaction can be a problem, especially under wet soil conditions which often make compaction more severe. If the B and C-horizons become compacted, mechanical treatment may be required to loosen the soil.

Soil compaction can result in a number of problems, such as poor root penetration, difficult cultivation, poor seedbed preparation, decreased soil porosity and water infiltration, and increased soil density and surface water runoff. If a layer of shallow topsoil is placed over compacted subsoils, root binding may occur.

6.6.6 Soil Replacement During Reclamation

To ensure effective reclamation, the soil lifts must be replaced in the reverse sequence to which they were removed. Before soil is replaced, the site should be contoured to ensure there is no net change in surface hydrology. On non-forested lands, the soil lifts should generally be spread as evenly as possible.

In forested areas, attempts to level the site may further damage the soil owing to the likelihood of wet soil conditions. In addition, soil levelling can contribute to a perched water table and lead to a change (reduction) in drainage class of the soil. An even surface also reduces the availability of oxygen to tree roots on soils prone to perched water tables, or which have poor percolation rates. Trees tend to grow better on a rough surface, and a rougher surface is more effective in controlling erosion.

6.6.7 Soil Loss

Soil loss is affected by four primary factors:

1. **Climate** — directly influences erosion by determining the magnitude, duration and intensity of rainfall or droughts. Intense rainfalls can dislodge more soil particles, resulting in greater erosion. Similarly, high-velocity winds can lead to significant erosion.
2. **Soil Characteristics** — four characteristics that affect soil erodibility are:

- *Texture*: the size and proportion of clay, silt and sand particles making up the soil.
- *Organic matter content*: the decayed remains of plants and animals, and complex substances synthesized by soil organisms.
- *Structure*: the arrangement of the particles of a soil in the soil matrix.
- *Permeability*: the ease with which water penetrates or passes through a bulk mass of soil or a layer of soil.

3. **Vegetative Cover** — protects soils erosion by wind, raindrops and running water. Vegetation also reduces surface runoff velocity, aids the soil in water absorption, and is an essential element for successful soil stabilization. Removing vegetation should be minimized, since this action increases the erosion potential of the site.
4. **Topography** — soil loss is influenced by the shape, length, inclination and aspect of a slope and general configuration of the terrain.

6.7 EROSION AND SEDIMENTATION

Two types of erosion generally occur — geological erosion (occurs under natural conditions) and accelerated erosion (generally man-induced through surface disturbance). The main causative agents are wind, water, ice and gravity. Industrial/commercial construction and operational practices can greatly affect the degree of wind and water erosion that occurs on a site.

- *Water erosion* — The severity of water erosion depends on the intensity of precipitation, soil characteristics, slope length, aspect and gradient, and the degree of disturbance. The four types of soil erosion that involve water are rainfall erosion, sheet erosion, rill and gully erosion, and channel erosion.
- *Wind erosion* — The severity of wind erosion depends on wind speed, soil characteristics, moisture conditions, surface roughness and the size of exposed area.

Erosion of a disturbed area may affect the stability of a slope, resulting in bank slumping and poor aesthetics until vegetation is re-established. In a waterbody or watercourse, sediment is often suspended or deposited in the water, resulting in partial or complete blockage of culverts/channels and destruction of fish habitat. Road construction is a major contributor to erosion and sedimentation.

6.7.1 Effects of Sedimentation on Watercourses/Waterbodies

Significant effects of suspended sediment and deposition include:

- reduction in water quality for domestic, agricultural, recreational and industrial purposes;
- reduction in water quality for aquatic life;
- reduction of storage capacity and hydraulic capacity of structures, channels and waterbodies;
- silt damage to adjacent property from flooding;
- interference with the photosynthetic processes of aquatic plants;
- reduced feeding efficiency of sight feeders;
- irritation of the respiratory system and abrasion of the protective mucous coating of fish;

- smothering of invertebrate microhabitats and aquatic plants;
- increases in undesirable aquatic vegetation;
- interference with intragravular flow and creation of unstable stream substrates;
- reduced fish populations resulting from impaired incubation of fish eggs and reduced survival of fry; and
- reduced amount of fish habitat due to sediment filling in pools and backwater areas.

6.7.2 Sediment Control

Sediment control structures or facilities can be used as a temporary measure to control sediment resulting from erosion. Three commonly used structures are barriers, traps and basins. The velocity of the water has to be reduced before the sediment load can be controlled. Channel liners, energy dissipaters, rip rap, permeable berms, and vegetation can be used to slow down the water speed. When the flow is reduced, the sediment load decreases and is deposited at specific pre-designed points.

6.7.3 Erosion Control Methods

There are two categories of erosion control measures: temporary and permanent. Temporary controls are short-to-medium term, and last until permanent controls are established. Permanent controls are intended to remain in existence indefinitely, or for the life of the project or activity.

The most common methods for stabilization and erosion prevention are as follows:

- vegetative method (re-establishing vegetation);
- mechanical method (shielding soil surface);
- tackifier method (applying tackifiers to create a crust);
- structural method (add structures to divert water);
- rollback/debris spreading; and
- slope modification.

VEGETATIVE METHOD

Vegetation is the only true, long-term, flexible and self-perpetuating erosion control method. It controls erosion, both temporarily and permanently, by establishing a protective vegetative cover. It is recommended that acceptable seed, plants and fertilizer (if required) be applied as soon as possible after site completion.

Establishing vegetation will control erosion by:

- protecting the soil surface;
- shielding the soil from rainfall impact;
- adding organic matter to the soil;
- reducing the amount and velocity of runoff;
- holding soil particles in place with the root system;
- reducing wind velocity at ground level; and
- improving soil permeability and texture.

Since vegetation requires time to become established and grow to a satisfactory density for effective erosion control, other interim measures for erosion control may be required.

MECHANICAL METHOD

This method, usually in the form of blankets or netting used in conjunction with straw mulch (free of weed seeds) or other similar material, achieves temporary control by shielding the soil surface from erosive forces, reducing runoff velocities and increasing water percolation. It also helps to retain soil moisture, maintains favourable soil temperatures for seed germination, adds organic matter to the soil, and prevents wind from removing the seeds.

TACKIFIER METHOD

Tackifiers are chemical binding agents used to bind or stabilize soil stockpiles against wind or water erosion until vegetation is established. They can improve the strength of the surface layer by forming a surface crust when sprayed onto the exposed soil surface. Tackifiers may be sprayed or mixed with various types of organic material (e.g., clean straw, wood cellulose fibres or shredded paper) in combination with water, seed and fertilizer.

If the soil will be used immediately to reclaim the disturbed area, tackifiers may be used without seeding. For long-term soil storage, tackifiers should be used along with seeding to prevent erosion and weed infestation.

STRUCTURAL METHOD

Earthen dikes, gabion baskets, rock armouring and interceptor/diversion ditches can be used alone or in combination to isolate or divert water away from areas that are actively eroding or have a high potential for erosion. Drop structures, spill structures, down-drains and other types of energy dissipaters may be used to reduce velocity and carry water to lower elevations.

ROLLBACK/DEBRIS SPREADING

This is the practice of spreading woody debris over the site after completion of the activity. During site preparation, slash and debris may be stored at the edge of the site or at an approved location. When the site is reclaimed, the slash and debris can be spread on exposed cuts and fills and other exposed areas to prevent erosion and facilitate vegetation growth. In order for the debris to be effective for erosion control, it must lie flat to the ground. If slash and debris are used for erosion control, measures must be taken to ensure that it does not enter watercourses or waterbodies.

SLOPE MODIFICATION

In some cases, the angle of the slope may be altered to decrease erosion potential. The degree of slope should be considered carefully, since a slope that is too steep will be unstable and erode until equilibrium is attained and vegetation is established.

7.0 VEGETATION MANAGEMENT

Vegetation management and infrastructure maintenance are part of the overall project management. A vegetation management plan will need to be developed. As part of the development process, the following should be evaluated carefully:

- the specific site location and attributes,
- existing vegetation,
- proposed and future land use,
- design functionality of the facilities,
- reclamation requirements.

Any soil stockpiles should be stabilized (with as low relief as possible), and revegetated to control erosion if they will be retained for any length of time.

OBJECTIVES

Plan and conduct vegetation management on commercial/industrial operations as follows:

- Minimize and mitigate any adverse impact on the environment and natural resources.
- Selectively control the growth of vegetation as required for the site.
- Promote the use of native species to revegetate disturbed sites within native plant communities, or use applicable agronomic species for agricultural sites.
- Prevent the spread, growth, ripening and scattering of restricted and noxious weeds and their seeds.
- Maintain the integrity of the infrastructure (e.g., culverts, roads) and land surface during the life of the activity/project.
- Minimize the potential for wildfire, and the threat to a facility/personal property from an approaching wildfire.
- Minimize the impact on other resources.
- Exercise due diligence and meet safety standards required by applicable legislation.

STANDARDS

1. Fire prevention maintenance and vegetative management shall be carried out in accordance with the *Forest and Prairie Protection Act* (Note: a fire permit is required for any burning during fire season).
2. Plants designated as weeds under the *Weed Designation Regulation* or by municipalities shall be controlled and/or destroyed in accordance with the *Weed Control Act*.
3. Reclamation of "specified land" under the *Environmental Protection and Enhancement Act* shall be carried out in accordance with the *Conservation and Reclamation Regulation*.
4. Areas of erosion shall be identified and immediately stabilized.

5. The application, handling, transportation, storage, or disposal of a hazardous substance or pesticide shall be in accordance with the *Environmental Protection and Enhancement Act, Part 8, Hazardous Substances and Pesticides*.
6. The application of any classified pesticides by certified applicators under the *Environmental Protection and Enhancement Act, Pesticide Regulation* shall be sold, handled and used in accordance with the *Pesticide Sales, Handling, Use and Application Regulation*.

7.1 VEGETATION MANAGEMENT

MECHANICAL CONTROL

Mechanical vegetation control is generally preferred over chemical control, although in specific situations it may cause compaction. Several mechanical devices are available to control vegetation, but mowing is the most common. This method controls vegetation and the growth and spread of weeds immediately, while leaving the root mass untouched to continue holding the soil. It is preferred for areas where chemical control must be avoided owing to the potential for contamination (e.g., around watercourses).

MANUAL REMOVAL

Hand picking may be necessary in site-specific situations where other mechanical control or chemical control methods cannot be used. This may be owing to area restrictions, sensitivity, safety, or when a particular plant species is the control target.

CHEMICAL CONTROL

Chemical control is only for site-specific situations where the environment will not be adversely impacted, and where other methods of vegetation control are not feasible. The following factors must be considered before selecting chemical control:

- public safety;
- impact on fish and wildlife, and aquatic and terrestrial habitats;
- effects on re-establishing native plants, particularly forbs;
- long-term use of the land;
- potential impact of the spraying operation on the surrounding area (i.e., residential area, crops, livestock);
- potential for the migration of chemicals off-site owing to topography, susceptibility of site to wind and water erosion, and other factors;
- potential for leaching and chemical movement owing to soil texture, permeability and drainage;
- potential impact of chemical control methods on watercourses, reservoirs and other waterbodies;
- history of vegetation control successes and failures on the site;
- potential impact on landowners, communities and local authorities; and
- costs and impacts associated with reclaiming chemically contaminated soils.

The *Forest Management Herbicide Reference Manual* (revised July 2001) outlines legislation, policies, violations, inspections, incident reporting and follow up.

HAZARD REDUCTION BURNING

Hazard reduction burning may be necessary along road or railway rights-of-way to control heavy vegetative growth. In some cases, prescribed burning is used to control brush invasion and rejuvenate grassland by decreasing heavy accumulations of litter. All burning must be done under safe conditions and at the appropriate time of year to prevent the spread of fire and minimize smoke along roads. A burning permit is required during the fire season (usually April 1 to October 31). The disposition holder is responsible for completely extinguishing all fires that occur on the disposition.

MONITORING RESTRICTED AND NOXIOUS WEEDS

The site should be monitored for restricted and noxious weeds, and weed control undertaken when necessary. Best results are achieved when the control action occurs at the most susceptible period for each species. In all cases, native plant species should not be killed. The local district office of Alberta Agriculture, Food and Rural Development, the municipal government office, or the local PLFD office can be contacted for assistance in identifying vegetation species that are considered restricted or noxious for a region, or for information on the type and timing of treatment for various species.

REVEGETATION

After the area has been reclaimed, it should be monitored for weed growth and checked for areas where no vegetative regrowth has occurred. Any areas that may experience erosion or scour (e.g., badlands, sand dunes, highly erodible slopes) should be monitored frequently after reclamation to ensure revegetation has been successful. Monitoring should continue until the vegetation cover meets or exceeds current SRD/AENV reclamation standards.

LAND MAINTENANCE

Land maintenance needs to be carried out to ensure the design grades and integrity of the land are maintained for the end land use following progressive reclamation. If the site is surrounded by native species, the preferred method of land maintenance is to re-establish native plant species in all areas that do not require bare ground for safety or operational reasons.

NATURAL RE-ESTABLISHMENT OF NATIVE PLANT SPECIES (REFER TO INFORMATION LETTER C&R/IL/02-2)

In some cases, small, disturbed areas may revegetate naturally without seeding. If natural recovery is appropriate, the site must be far enough away from exotic perennial weed populations to avoid infestation (e.g., Canada thistle). On White Area public lands, an arbitrary distance of 2 km is used. Some advantages of using native species for revegetation include:

- maintains native ecosystem function and structure;
- provides a variety of ecological niches for other life forms;

- ensures that landscapes are aesthetically pleasing, and that revegetation blends into the surrounding landscapes;
- maintains genetic diversity; and
- results in reduced soil erosion due to the superior soil-holding capability of many native species.

7.2 MAINTENANCE

A regular program of monitoring and maintenance should be undertaken to ensure the facilities and infrastructure continue to meet user safety requirements, maintain their structural integrity, and have minimal negative effect on the environment. Access roads, bridges, culverts, wellsites and battery sites, pipelines, power transmission lines and extraction sites also require stringent maintenance programs.

7.2.1 Access Routes

In areas where potential and/or recurring problems exist, maintenance plans may be required. These plans should contain details of work required on a site-specific basis, and be reviewed by the operator and the Area Land Manager. In regions that are particularly sensitive to erosion, maintenance plans may be required for all roads. Refer to Section 3.0 of this manual for fisheries requirements if the necessary maintenance will disturb or alter the bed and banks of a waterbody.

ROAD GRADES

- Protect the structural integrity of the road grade and sub-grade.
- Repair and clean ditches, ancillary drainage works, and erosion and sediment control structures regularly to ensure the drainage systems are functional. Remove any blockages such as accumulated debris, soil and vegetation that may be restricting the design flow.
- Maintain and repair road surfaces.
- Avoid blading gravel onto the shoulders of the road. The buildup of gravel ridges acts as a berm, and will channel and consolidate water runoff to the bottom of depressions or bridge abutments, causing severe erosion and instability.
- Minimize erosion and sediment production along the rights-of-way, and the resulting impact on watercourses and waterbodies.

VEGETATION MANAGEMENT

- Control vegetation along road rights-of-way to provide for safe travel, sight distance and fire hazard reduction.

BRIDGES

- Maintain the components of the bridge to ensure integrity of the structure and design functionality.
- Repair or replace bridge structural components, worn planking and decks when they become damaged or decayed, or are unsafe in any way.

- Clean bridge decks to remove accumulated gravel and debris (do not push the debris or gravel into the water).
- Do not grade gravel onto the bridge deck.
- Immediately repair erosion around bridge abutments and piers.

CULVERTS

- Maintain and repair culverts to ensure integrity of the structure and design functionality.
- Stake, flag, or otherwise mark the location of culverts to identify them and prevent damage by road maintenance equipment.
- Clean culverts regularly to remove any blockages such as accumulated debris, soil and vegetation that may restrict the design flow.
- Remove ice dams from culverts as required. Ice blockages within culverts are common during the winter, acting as a dam and causing water to back upstream and pond during spring runoff. This pooling increases the potential for overtopping, erosion and damage to the road surface. Culvert steaming may be necessary to keep culverts open.

ICE BRIDGES/SNOWFILLS

- Regularly maintain ice bridges/snowfills during their period of use.
- Remove snow bridges/snowfills before spring break-up.

7.2.2 Other

WELLSITES AND BATTERY SITES

- Maintain berms and other structural facilities for the control and containment of drilling fluids and other contaminants.
- Maintain drainage ditches.
- Control vegetation around wellheads, plant yards and flare stacks to prevent wildfire.

PIPELINES

- If the required maintenance will disturb or alter the bed and banks of the waterbody and/or affect a fishery, see Section 3.0 for information on maintaining pipeline crossings and applicable codes of practice.

POWER TRANSMISSION LINES AND DISTRIBUTION LINES

- Control vegetation within the rights-of-way and the vegetation control easement to ensure design functionality of facilities, and minimize the potential for wildfire.

SURFACE MATERIALS EXTRACTION OPERATIONS OR LEASES

- Maintain berms, dykes and other structural facilities used for controlling or containing water, including drainage facilities.
- Minimize risk to watercourses and waterbodies from erosion, siltation and sedimentation.

8.0 WATER MANAGEMENT

OBJECTIVES

Plan and conduct operations on public lands:

- Ensure protection of aquatic and riparian habitat for fish and wildlife species of management concern.
- Minimize the amount and duration of construction in any watercourse/waterbody, and any adverse effects on other water users.
- Maintain fish passage and migration, and the natural drainage patterns.
- Avoid, or minimize and mitigate the following:
  - activities that contribute or result in erosion and stream sedimentation,
  - disturbance to the bed and shore/banks[3] of any watercourse/waterbody,
  - any adverse effect on water quality and quantity,
  - intermixing of ground water and surface water, and
  - activities that affect or alter waterbody levels and watercourse flows.

STANDARDS

1. Conservation and management of water, including allocation and use of water, as well as the protection of fish habitat and the aquatic environment, must be in accordance with the *Water Act/Regulation*. The direct link for the codes of practice and water legislation is: http://www.gov.ab.ca/env/water/legislation/index.html

   (a) Licences issued under *Water Act* for the diversion and use of water, and approvals for activities that are not exempt under the *Water Act, Water (Ministerial) Regulation* or regulated by a code of practice.

   (b) *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* — outlines the requirements when constructing a pipeline or telecommunication line across a watercourse/waterbody.

   (c) *Code of Practice for Watercourse Crossings* — outlines the requirements for watercourse crossings that are not exempt under the Water Act and Water (Ministerial) Regulation.

   (d) *Codes of Practice for Temporary Diversion of Water for Hydrostatic Testing of Pipelines* — outlines the requirements for the temporary diversion of water for hydrostatic testing of pipelines.

2. Watercourse crossings in the forested area (Green Area) that are exempt from an approval under the *Water Act/Regulation*, or are not regulated by the *Code of Practice for*

[3] The "bed and shores" of most permanent and naturally occurring waterbodies are owned by the Province of Alberta under the *Public Lands Act*. The *Water Act* applies to waterbodies on both public land and private land. The distinction between the "bed and shore" under the *Public Lands Act* and "waterbodies" (includes bed and banks) under the *Water Act* is important. It is suggested that the *Public Lands Act* and the *Water Act* be consulted for clarification.

Watercourse Crossings, must follow the *Alberta Timber Harvest Planning and Operating Ground Rules* or *Forest Management Agreement Timber Planning and Operating Ground Rules*, or the terms/conditions of the dispositions/authorizations issued under the *Public Lands Act* and *Exploration Regulation*.

3. Entry and occupation of public lands shall be carried out in accordance with the *Public Lands Act* and *Dispositions and Fees Regulation*:
4. Geophysical operations shall be carried out in accordance with the *Exploration Regulation*.
5. Where operations are conducted in a forest, the watershed/watercourse shall be protected in accordance with the *Forest and Prairie Regulations, Part II*.
6. Watershed protection associated with timber harvesting operations on public lands shall be carried out in accordance with the *Forests Act* and *Timber Management Regulation*.
7. Timber harvest operations in the forested areas shall incorporate measures to protect the watershed in accordance with the *Alberta Timber Harvest Planning and Operating Ground Rules* or *Forest Management Agreement Timber Planning and Operating Ground Rules*, and any additional terms/conditions prescribed.
8. Substance release into the environment (including water) must be approved under the *Environmental Protection and Enhancement Act (EPEA)* and *Regulations*.
9. Construction and operation of waterworks systems for potable water and domestic wastewater or sanitary sewage systems must be approved under *EPEA*, *Potable Water Regulation*, and the *Wastewater and Storm Drainage (Municipal) Regulation*.
10. Alberta Energy and Utilities Board legislation covering surface water/groundwater:
    (a) The *Hydro and Electric Energy Act* — requirements for constructing and operating power transmission lines and power plants.
    (b) *Oil and Gas Conservation Act* and *Regulations*:
        - *Part 2 (Regulations), Licensing of Wells* — siting facilities with respect to waterbodies and the existing water table.
        - *Part 8 (Regulations), Prevention of Losses, Injuries, Damages and Fires* — water disposal and control of oil and saltwater spills.
        - *G8, Surface Casing Depth Minimum Requirements*.
        - *G20, Well Abandonment Guide*.
        - *G50, Drilling Waste Management*.
        - *G51, Injection and Disposal Wells. Wells Classifications, Completions, Logging, and Testing Requirements*.
        - *G58, Oilfield Waste Management Requirements for the Upstream Petroleum Industry*.
11. The proponent must also comply with federal legislation (see Section 3.0).

9.0 WASTE MANAGEMENT

OBJECTIVES

Plan for and handle any type of waste that results from industrial or commercial activity:

- Prevent, or minimize and mitigate any soil/water contamination or other adverse impact on the environment and natural resources.
- Ensure waste material, debris, refuse or garbage on public lands does not accumulate.
- Ensure levels of waste and its components do not form a hazard to human or animal health, and do not detrimentally affect soil quality and surface/ground water quality.
- Ensure there are no adverse effect on germination, growth and sustainability of vegetation and equivalent land capability.
- Ensure no off-site releases or migration of wastes occur.
- Ensure all wastes are handled, recycled, reused, and disposed of in accordance with applicable legislation, standards, guidelines and accepted practice.

STANDARDS

1. Waste management shall be carried out in accordance with the *EPEA Waste Control Regulation*. (Note: the term litter is replaced by waste, and includes garbage, paper, sewage and discarded vehicles.) Oilfield waste (not including wastes generated at mining oil sands plants) is not regulated under this legislation, although mismanagement of oilfield waste is subject to the provisions of *EPEA*.

   (a) *Activities Designation Regulation* — identifies waste management activities that require approval, registration or notification.

   (b) *Guidelines for Land Treatment of Industrial Waste* — minimum requirements for the design and operation of a land treatment facility.

   (c) *Code of Practice for Compost Facilities* — the requirements to be followed by compost facilities requiring registration under the *Activities Designation Regulation* (Class 1 compost facilities accepting 20,000 tonnes or less of waste per year). (Persons responsible for compost facilities should refer to the *Activities Designation Regulation* and the *Waste Control Regulation* to determine whether a compost facility requires notification, registration or approval under *EPEA*.)

   (d) *Code of Practice for Landfills* — the approval and reclamation requirements for specific types of landfills (applies to landfills accepting 10,000 tonnes or less of non-hazardous waste per year). Refer to the *Activities Designation Regulation* to determine whether the activities require approval.

   (e) *Code of Practice for the Land Treatment and Disposal of Soil Containing Hydrocarbons* (Draft) — the requirements for registration, siting and design, operations, closure, monitoring and reporting.

   (f) *Code of Practice for the Production of Alternate Fuel and the Burning of Fuel Derived from Waste* (Draft) — provides registration forms for the production of alternate fuel

from 10 tonnes or less of waste per month, and for the burning of 10 tonnes or less of fuel derived from waste in combustion units or space heaters.

(g) *Code of Practice for Small Incinerators* (Draft) — the requirements for the registration of Class 1 to Class 5 small incinerators, and emission limits for class 3, 4, and 5 incinerators.

(h) *Alberta User Guide for Waste Managers* — Alberta's waste classification procedures and test methods, waste management options, transportation and manifest requirements, *EPEA* approvals system and interpretation of the Act and Regulations.

(i) *Alberta Tier I Criteria for Contaminated Soil Assessment and Remediation* — a listing of contaminants that may be used as a guide to determine the need for remediation, and qualifies the acceptable concentrations of soil contaminants.

(j) *Surface Water Quality Guidelines for Use in Alberta* — general guidance in evaluating surface water quality throughout Alberta. These guidelines are also used in setting water quality based approval limits for wastewater discharges.

2. Stormwater drainage and wastewater systems shall be in accordance with the EPEA Wastewater and Storm Drainage Regulation.

(a) Waste management associated with the petroleum and natural gas industry must be carried out in accordance with the EUB *Oil and Gas Conservation Act* and *Oil and Gas Conservation Regulation*.

(b) *IL 94-2* and *Guide 51, Injection and Disposal Wells, Well Classification, Logging, and Testing Requirements*.

(c) *ID 95-3* and *Guide 55, Storage Requirements for the Upstream Petroleum Industry*.

(d) *ID 96-3* and *Guide 58, Oilfield Waste Management Requirements for the Upstream Petroleum Industry* — a wide range of waste management issues that apply to oilfield wastes, and other issues which indirectly affect the management of wastes produced by the upstream oil and gas industry in Alberta.

(e) *IL 96-13* and *Guide 50, Drilling Waste Management* — requirements for disposal of drilling wastes.

(f) *IL 98-1, Coordination of Release Notification Requirements and Subsequent Regulatory Response*.

(g) *IL 98-2, Suspension, Abandonment, Decontamination, and Surface Land Reclamation of Upstream Oil and Gas Facilities*.

(h) *ID 99-4, Deposition of Oilfield Waste into Landfills*.

(i) *IL 99-5, Elimination of the Surface Release of Produced Water*.

3. Waste management on public lands shall be carried out in accordance with the *Public Lands Act* and *Dispositions and Fees Regulation* and associated policies:

(a) *Drilling Waste Management – Disposal on Licence of Occupation* (*DOLOC*) — a method to be used with Guide 50 for off-site disposal of drilling waste in the forested area (Green Area), whereby specific types of drilling wastes may be applied on predetermined developed sections of access road for Licence of Occupations and Mineral Surface Leases.

(b) *Policy for Landspraying While Drilling on Public Lands in the White Area.*

(c) Land Manager (internal staff use): *Landspraying While Drilling (LWD): Minimizing Disturbance to Natural Landscapes.*

4. The design, construction, installation, operation, and maintenance of a private disposal system (under $25m^3$/day) must be in accordance with the *Safety Codes Act* (Alberta Municipal Affairs).
5. *Alberta Private Sewage Systems Standard of Practice* — on-site installation standards for septic tanks, sewage holding tanks, sewage effluent tanks, disposal fields and sewage or effluent lagoons.
6. *Code of Practice for Responsible Livestock Development and Manure Management, 2000* (400/27-2) — direction for establishing and operating livestock facilities in Alberta to encourage a responsible and sustainable agriculture industry. (Currently this use of public land is not approved.)
7. Waste management associated with timber harvesting or salvage operations must be carried out in accordance with the *Timber Management Regulations* and, where applicable, the *Alberta Timber Harvest Planning and Operating Ground Rules* or *Forest Management Agreement Timber Planning and Operating Ground Rules*, and any additional terms/conditions prescribed.
8. All sumps containing sewage from a kitchen or washroom facility must be properly treated daily and disposed of in accordance with the *Public Health Act*.
9. Disposal of liquid or solid waste matter in a forest recreation area shall be in accordance with the *Forest Recreation Regulation*.
10. In a forest, contamination or pollution of any land, water system, river or stream is not permitted under the *Forest and Prairie Protection Regulations, Part II*, the *Water Act*, the provincial *Fisheries Act*, and by the federal Department of Fisheries and Oceans (DFO).
11. Hazardous waste (radioactive materials and explosives) is regulated by the federal government under the *Canadian Nuclear Safety Act* and the *Explosive Products Act*.

10.0 RECLAMATION

The requirements for abandonment and reclamation should be considered at each stage of a project or activity. This ensures co-ordination between all aspects of the activity and final reclamation. Private landowners, as well as the Land Managers and disposition holders, should be contacted to determine if there are any specific features or management concerns that need to be addressed in the reclamation plan.

The objective of reclamation is to return disturbed land to a capability (end land use) that is equivalent to, or greater than what existed before. Vegetation on reclaimed land must be sustainable under normal management, which means plant communities becoming established and mature without an ongoing, external source of nutrients, water, seeds or seedlings. Reclaimed sites must also be able to recover from naturally occurring environmental disturbances such as fire, floods or drought at a rate comparable to representative undisturbed land.

OBJECTIVES

Plan and conduct all operations:

- Within a reasonable or pre-determined timeframe, return the disturbed area to an equivalent land capability through replacement and preparation of soil materials.
- Promote native species to revegetate disturbed sites within native plant communities or, alternatively, acceptable species for agricultural sites.
- Encourage the eventual establishment of native plant communities within native landscapes.
- Where appropriate, on a site-specific basis, consider the use of non-native species to meet short-term revegetation goals or accepted land use needs.
- Establish self-sustaining, healthy vegetative growth.
- Minimize the loss of land productivity.
- Ensure the land will be able to support acceptable end land uses.
- Return the land to original or near original landform and drainage, or to an acceptable drainage pattern compatible with the end land use.

STANDARDS

1. Reclamation of public lands shall be carried out in accordance with the *Environmental Protection and Enhancement Act* (*EPEA*), *Conservation and Reclamation Regulation*.
   (a) *Reclamation Criteria for Wellsites and Associated Facilities* (C&R/IL/95-3).
   (b) *Code of Practice for Exploration Operations* — the environmental requirements for conducting and reclaiming an exploration operation for coal and oil sands.
   (c) *Code of Practice for Landfills* — the approval and reclamation requirements for specific types of landfills. Persons responsible for these landfills should refer to the *Activities Designation Regulation* to determine whether their activities will require an approval.

(d) *Code of Practice for Oil Production Sites* — outlines the environmental requirements for conducting and reclaiming an oil production site. Oil production sites are heavy oil sites located in a specific area of the province shown on a map attached to the Code of Practice. Oil production sites that require an environmental impact assessment must have approval under *EPEA*.

(e) *Reclamation Criteria for Abandoned Railways* (C&R/IL/96-3).

(f) Reclamation Certification (RC) is required under *EPEA* for coal mines, oil sands mines, quarries, sand and gravel pits, borrow excavations, pipelines, wellsites, railways, roadways, peat operations, and transmission lines. To date, reclamation criteria have been developed for wellsites and abandoned railways.

2. Reclamation of public lands shall be carried out in accordance with the dispositions and authorizations issued under the *Public Lands Act*, *Forests Act,* and *Exploration Regulation.*

3. Reclamation (including silviculture and reforestation) within forested areas shall be conducted in accordance with the *Alberta Timber Harvest Planning and Operating Ground Rules* or *Forest Management Agreement Timber Planning and Operating Ground Rules*, and any additional conditions prescribed by the Minister.

4. Regrowth and performance of desirable tree species on harvested or, as applicable, other denuded forested lands shall be in accordance with the Free-to-Grow Standards outlined in the *Alberta Regeneration Survey Manual* (May 2000).

5. Weeds designated under the *Weed Designation Regulation* shall be controlled and/or destroyed in accordance with the *Weed Control Regulation*, or as designated by the local municipality.

6. Reclamation that may impact a watercourse/waterbody, or results in the creation of a water diversion/waterbody, shall be in accordance with authorizations issued under the *Water Act*.

7. Water quality and waste management should be in accordance with guidelines developed under *EPEA*.

10.1 PLANNING/PROCEDURAL GUIDELINE DOCUMENTS

Conservation and reclamation of public lands should be carried out in accordance with the guidelines under the *EPEA*, *Conservation and Reclamation Regulation*, and other procedural documents.

- *Guide for Oil Production Sites*
- *Guide for Pipelines*
- *Guide for Pits*
- *Guide for Transmission Lines*
- *Guide for Alternative Soil Handling Procedures During Pipeline Construction.*
- *A User Guide to Pit and Quarry Reclamation in Alberta.*
- *Land Capability Classification for Forest Ecosystems in the Oil Sands* (C&R/IL/98-7 and report ESD/LM/98-1).

  - *Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region* (C&R/IL/99-1 and report ESD/LM/99-1).
  - *Guideline for Wetland Establishment on Reclaimed Oil Sands Leases* (C&R/IL/00-2 and report ESD/LM/00-1).
- All exploration, excavation and reclamation of surface materials (except peat) on public lands should be carried out in accordance with *A Guide to Surface Material Resource Extraction on Public Lands*. This document outlines the procedures for developing and reclaiming a surface material operation (except peat) on public lands.
- *Native Plant Revegetation Guidelines for Alberta*. Native Plant Working Group. (2001) — Outlines information on using native plants to re-establish a native plant community. The guidelines also include a listing of weeds from the *Weed Control Act,* how to interpret seed analysis certificates, commercially available native plant material, and guidelines on wild harvesting of native plants. (The guidelines are available from Public Lands and Forests Division.)
- *Alberta Forest Seed and Vegetative Materials Policy and Guidelines Manual* (June 2000).
- *A Guide to Using Native Plants on Disturbed Lands*. (1996) — Provides a starting point for planning revegetation projects and a listing of native trees, shrubs, forbs and grasses found on various site types in the different natural regions of Alberta. Includes information for the reclamation industry, seed producers and nurseries, land management agencies, municipalities, landscapers and gardeners. It lists the native plants suited to the various natural regions and site types across Alberta. The guide also provides detailed information about the ecology, reproduction, habitat and availability of 130 native grasses, 260 wildflowers, 80 shrubs and 13 tree species. (Available for purchase from Alberta Agriculture, Food and Rural Development, phone 1-800-292-5697.)

10.2 RESTORATION

Restoring native landscapes to their original state is desirable, depending on the end land use. Re-establishing sound ecological functions and eventually restoring the original range of variability in biological structure and diversity is encouraged. This will help to maintain multiple use capability and benefits of the land, including livestock grazing, wildlife habitat, soil and watershed conservation protection for endangered plants and animals, and aesthetically pleasing landscapes.

SOIL

Salvaged topsoil and surface strippings are needed to re-establish native plant species on disturbed areas. Viable native seeds and rootstocks contained in the surface soil material contribute to restoring a stable native plant community.

- Subsoils may need to be ripped or scarified before topsoil replacement to break up compaction.
- On non-forested sites, the topsoil or surface soils should be replaced evenly across the site.
- On forested sites, or where native vegetation and biodiversity are the goals, an uneven or variable topsoil depth may be preferred since it provides varying microsites.

LANDSCAPE

- Landforms disturbed by industrial/commercial activities should be reclaimed/re-contoured to resemble pre-disturbance conditions, blend into adjacent landforms, or meet intended end land use parameters.
- Re-contouring sites should be done using subsoil and spoil materials, not topsoil.
- The new landforms should be stable and designed to convey water to natural or constructed watercourses or waterbodies.

10.3 REVEGETATION

The prime purpose of revegetation is to stabilize the soil by establishing a strong root system that minimizes erosion and helps to re-establish land capability/productivity. Revegetation is typically one of the last steps in the reclamation process; however, careful planning can greatly enhance the outcome. This is particularly true when native landscapes are involved.

Ecosite revegetation requires consideration of appropriate landscapes, soils, starter species and reclamation techniques that provide conditions appropriate for the target ecosite phase and will achieve the desired results.

Native plant species, which may differ in various ecoregions, are generally preferred for reclamation, except in agricultural areas where the appropriate agronomic species may be used. The selection and application of a seed mix that has been recommended for a specific site depends on the following criteria:

- topography (e.g., slopes, hills);
- adjacent vegetation or vegetation in close proximity;
- aspect (orientation to sun exposure);
- water content and salinity of the soil; and
- type of soil.

Although, grasses are generally used for reclamation, additional vegetation (e.g., forbs, shrubs, trees) may be required for specific sites. The best vegetation type/seed mix and fertilizer mixture can be determined using the following guidelines:

- Observe past successes on similar sites in the area.
- Obtain technical or professional advice from people who are experienced in the area, or who have had experience with similar sites (e.g., seed suppliers, agrologists, foresters, etc.).
- Obtain a soil analysis.

Soil type has a bearing on the method of seed application and vegetation establishment in specific ecoregions. Light soils that are susceptible to wind and water erosion require some form of cover to help retain seeds and ensure vegetation establishment.

On agricultural lands, it is generally useful to consult with the grazing disposition holder and/or the Land Manager to determine grazing patterns and how they can be managed to ensure successful revegetation. Fencing may be required to ensure the area is protected from damage by livestock.

10.3.1 Native Landscapes

Where the site is surrounded by native plant species, the preferred method of revegetation is to re-establish native plant species in all areas, either by seeding or natural recovery (natural self-seeding). Revegetation of native landscapes is simpler, faster and less costly when the disturbance is minimized. The advantages of using native species are:

- maintains native ecosystem function and structure;
- provides a variety of ecological niches for other life forms;
- ensures landscapes are aesthetically pleasing, and that revegetation blends into the surrounding native landscapes;
- maintains genetic diversity; and
- often results in reduced long-term soil erosion owing to the superior soil-holding capability of the strong root matrix found in many native species; however, the native species may take longer to become established.

Industrial or commercial activity should be avoided on native landscapes that are particularly sensitive owing to climatic factors, rough topography, presence of rare or threatened plants or animals, paleontological or archaeological significance, or other unique features. For example, rerouting a pipeline around threatened plant communities, such as rough fescue prairie, can both protect that area and simplify the revegetation planning for the project.

RE-ESTABLISHMENT OF NATIVE PLANT SPECIES

The conservation and use of local native plant materials is extremely important where rare or sensitive native plant species and communities are present, and also where important wildlife habitat must be conserved. Conserving the top few inches of soil that contain valuable seeds and rhizomes will enhance natural/native revegetation efforts. Cover crops can be used as a way to re-establish native plant species.

The surface must be stabilized and revegetation methods should be used that initiate, enhance, and/or accelerate reclamation of the site. In addition, the site should be protected from further stress while the plant community is being re-established, and managed to ensure long-term sustainability.

FERTILIZATION

Fertilizing is not recommended for native plant species, as the nitrogen in fertilizers promotes the growth of weeds that will compete with native plants. Adding fertilizer may actually slow down natural processes by favouring early successional species on the reclaimed area. It may also cause grasses to become dominant, thereby lowering species diversity. The use of a native nitrogen fixer (e.g., wild vetch [*Vicia americana*]) may be a reasonable alternative. The addition of phosphorous may be beneficial to assist the establishment of native seedlings, especially on sandy soils.

NATURAL RECOVERY AREAS

For small disturbances, the natural recovery option may be suitable if the erosion potential is low, problem weed invasion is low, and the surrounding natural landscape can provide a source of native plant material (usually seed). The main disadvantage of this option is the time frame, with 10 to 20 years required for successful revegetation to occur and the species composition, cover and density begin to resemble offsite conditions.

If natural recovery is to be used, the site should be sufficiently far away from exotic perennial weed populations (e.g., Canada thistle) to avoid infestation. Otherwise, native plant species may be out-competed because they generally have a slower growth rate. On agricultural lands, an arbitrary distance of 2 km is used. (Refer to Information Letter C&R/IL/02-2).

Use the following criteria to assess disturbed sites on public lands with native landscapes:

1. Sufficient plant cover must be present to control erosion. Generally, a minimum of 50% live cover (absolute) and 10%–20% naturally produced litter is sufficient. More cover is required on slopes (75% live and 10%–20% naturally produced litter).
2. Natural recovery areas (e.g., not seeded) should be monitored for weeds:
   - Minor amounts of transient, nuisance weeds (e.g., flixweed) are generally not a problem. These weeds may appear quickly following disturbance, but often disappear within three to five years as the disturbed area fills in with native species.
   - Noxious or restricted weeds, or persistent annual weeds (e.g., downy brome) are not acceptable on the disturbed area.
3. In agricultural areas, non-native species may be considered when:
   - the surrounding area already contains non-native species (e.g., hay or pasture);
   - the end land use allows conversion of native landscapes to tame forage; and
   - desirable native species are not available (i.e., non-persistent, non-native species can be used for erosion control).

10.3.2 Seed

The use of high-quality seed is important for ensuring successful revegetation. Knowing the seed purity, germination rate and where the seed comes from can prevent the introduction of undesirable weeds and invasive agronomic species.

Prior to mixing, a certificate of seed analysis for each seed lot should be examined to determine if the particular lot is acceptable, and whether the germination levels are adequate to meet project goals. Seed lots should be free of prohibited, primary and secondary noxious and restricted weeds as defined by the *Canada Seeds Act*, the *Weed Control Act* and the local municipality.

10.3.3 Site Preparation

Site preparation is one of the most important factors in determining the success of revegetation. Persistent weeds must be controlled before revegetation, which may take several years of active control. If forbs, trees or shrubs are planted on a site, or recolonization by these plants is desired, care must be taken to use weed control methods that will not harm these plants.

Site preparation using equipment that produces ridges and hollows creates microsites, which can enhance plant survival. This is particularly useful in environments that are susceptible to drought or wind.

10.3.4 Forested Lands/Timber Production

Reclamation for major disturbances on forested land may require annual, periodic, and long-range operating and reclamation plans to be submitted for approval.

Reclamation of disturbed forested lands should include recontouring to an acceptable landform, and revegetation to achieve soil stabilization for the desired end land use (e.g., timber production, agricultural purposes, aquatic and terrestrial habitat, and various kinds of recreational activities). Native species are highly recommended in forested areas to minimize problems associated with competing species.

The relative value of a reclaimed site for commercial forestry is determined by:

- landscape design and placements of polygons;
- soil productivity; and
- size, shape and species of each vegetation community polygon.

10.3.5 Wildlife

The relative value of a reclaimed site for wildlife habitat is determined by the following:

- its contribution to the overall food, cover, and space requirements of indigenous wildlife species;
- the degree to which diverse and productive, pre-disturbance natural vegetation communities and habitat types are re-established, including wetlands and open waterbodies; and
- the degree to which pre-disturbance and special habitat features are re-established, such as natural mineral licks, cliffs and caves.

10.3.6 Temporary Erosion Control

In some cases, temporary erosion control may be used to stabilize the soil on the disturbed site until the seeded native species can become established, thus increasing the potential of revegetation success.

CRIMPING

Crimping is a soil stabilization technique that presses straw (or native hay) into the soil in a wave-like pattern. It has been used extensively in southern Alberta on wellsites and pipelines to prevent soil erosion. Straw is spread over the site and a straw crimper with a rolling drum is used to press one end of the straw into the soil, pushing the other end upright. Crimping can provide protection for emerging seedlings, trap snow and help water infiltrate the soil.

Wheat straw is the most popular material for straw crimping, and usually provides erosion protection for a single growing season. Flax straw is often used on sites that are very susceptible

to erosion, and provides some protection for up to two years. (Note: There is some question as to whether oils in the flax can affect the growth of native plant seedlings in this environment.)

The quality of straw used for crimping is critical. Often the source of the straw has not been carefully checked, and some may contain weedy material that results in the spread of persistent weeds such as downy brome. The source of the straw must be known, and the source fields should be inspected for specific weeds. On public lands in the Southern Region, the use of straw for crimping must be approved by the Land Manager.

If weed-free straw is unavailable, using a clean annual cover crop (see below) is a reasonable alternative. Seed certificates are required for this seed.

COVER CROPS

Cover crops are generally used only where there is a concern about the potential for erosion on the reclaimed area. Any crop that is used should be non-persistent and non-invasive. If cover crops are used as a method to re-establish native plant species, the decision should be based on the site type, available moisture, potential competition for native seedlings, and the type of animals that may graze on the site.

- When cover crops are used, they should be seeded at half the normal rate (e.g., 1/2 bushel per acre).
- Annuals should be seeded separately from the native mix, with annuals seeded in the spring and the native mix in the fall. The cover crop can be mowed if it seems to be competing for moisture and light with establishing native plants.

Seeding of annuals is not recommended for pastures that are grazed early in the spring in southern Alberta. Durum or winter wheat is favoured because neither attracts grazers as readily as barley or oats. In some forested areas of Alberta, using winter wheat has led to overgrazing by cattle and wildlife.

A mixture that is used on sensitive natural recovery sites in southern Alberta is certified fall rye and flax, seeded at 1/2 bushel per acre. The flax is relatively unpalatable and protects the soil during the first growing season and winter. Cattle graze the fall rye heavily the first year and firm up the ground with their hooves. The rye is relatively unpalatable the second year and provides soil protection and traps snow. Some shelling occurs on both the rye and flax, which helps retain the ground cover as the native species become established.

10.4 ROAD ABANDONMENT

Road abandonment is directly related to the purpose of the road and the type of use the road will receive. The potential need for road abandonment should be considered in advance, preferably during the planning stages.

10.4.1 Temporary Abandonment

Temporary abandonment of a graded road requires complete removal of all drainage and crossing structures. Cross-drains, diversion ditches and other erosion control measures should be

installed as necessary. Although the grade will remain, all exposed surfaces should be revegetated. Entry onto the road should be blocked and an active maintenance program implemented.

10.4.2 Permanent Abandonment

Permanent abandonment of both graded and non-graded roads requires all drainage and crossing structures on the road rights-of-way to be removed completely. The rights-of-way must be reclaimed in a manner that ensures landforms are compatible with the surrounding landscape, vegetation cover is established to stabilize the soil, and productivity of the land is comparable to the adjacent undisturbed area. Sensitive areas may require varying stages and degrees of reclamation.

Scarification of road surfaces, recontouring of rights-of-way, replacement of soil material and surface strippings, and seeding with an acceptable plant species are all required as part of permanent abandonment. Depending on the site, debris may be scattered on the rights-of-way and walked down (compacted) for erosion control and revegetation purposes. Roadblocks on all access points leading to the rights-of-way may be necessary to discourage vehicle traffic, and to allow stabilization and re-vegetation of the abandoned area.

Under *EPEA*, reclamation certificates are required for roads associated with wellsites, pipelines, transmission lines, pits, borrow excavations and other forms of "specified land".

10.4.3 Watercourse Crossings (roads)

When planning a crossing structure, methods for effective abandonment should be considered. Each crossing site should also be assessed and reviewed to determine the potential for successful rehabilitation of riparian vegetation and fish habitat after abandonment.

Work in a watercourse/waterbody may require a disposition/authorization under the *Public Lands Act*, *Water Act* and/or federal *Fisheries Act*.

Abandonment of watercourse crossings may include:

- complete removal of all culverts;
- complete or partial removal of all bridges;
- complete removal of abutments in specific situations (abutments may be retained where they provide erosion protection and habitat for fish);
- installing cross drains and diversion ditches on all approaches;
- restoring and stabilizing streambanks, including the use of logs or gabions;
- creation of overhanging banks;
- revegetating all disturbed areas after landforming and recontouring;
- planting trees and shrubs in addition to normal seeding; and
- taking measures to prevent vehicular access after abandonment.

Follow-up inspections should be done to assess the effectiveness of rehabilitation measures on the crossing site. Additional measures for erosion control and streambank protection may be needed.

10.5 MINERAL SURFACE LEASES

10.5.1 Wellsite Reclamation Criteria

Reclamation requirements differ for wellsites in Alberta, with the newer sites having to meet more rigorous standards than older ones. Criteria also vary depending on the geographical land category and the end land use. The five main geographical land categories in Alberta are:

1. Cultivated land (most stringent criteria)
2. Grassland
3. Forested lands in the settled area.
4. Forested lands.
5. Peatlands.

Wellsite criteria address the condition of the landscape, soils and vegetation of the reclaimed area, as compared to the condition of the site before construction (where information is available), or with representative conditions on similar sites in the immediate area. Vegetation criteria are used to assess plant species composition, density, height, health and cover. Generally, the type and mix of species should be compatible with the original or control species, or meet reasonable land management objectives.

Plant density and height are generally used for annual crops, while cover is evaluated for perennial forages. These figures should be 80% of the control values if a comparable control is available, or 80% of expected performance of the crop for the area. In some cases, this level of cover has been found to be detrimental to native prairie. Reclamation inspectors will determine, on a site-specific basis, the level of cover under 80% that is acceptable.

For specific details on Reclamation Certificate requirements, consult the Alberta Environment website at http://www3.gov.ab.ca/env/protenf/landrec/certificate.html.

10.5.2 Pipelines

The Land Manager will assess the various factors involved in reclaiming the site and decide whether the pipeline must be removed before issuing a Reclamation Certificate.

APPENDIX 1. GLOSSARY

Access management plans — management plan that provides a framework for managing motorized and non-motorized travel in the planning area, and is developed with participation from concerned government agencies, local authorities and the public. Access management typically addresses a broad range of developments that require linear clearings for access and/or travel. It also looks at various modes of transportation, designation of trail systems (including entrance and exit points), seasonal use of routes and trails, and limits to travel in the area. In addition, it includes identification of a network of existing and proposed roads and trails.

Admixing — the dilution of topsoil with subsoil material, with the result that topsoil quality is reduced. Admixing can result in adverse changes in topsoil texture, poor soil aggregation and structure, loss of organic matter, and decrease in friability.

At risk species — species that are, or may be, at risk of permanent loss from the region or the province (i.e., red list and blue list species as listed in the *Status of Alberta Wildlife* report for 1996, as well as species designated as endangered or threatened under the *Wildlife Regulations* for the Province of Alberta [http://www.gov.ab.ca/qp/]).

Biodiversity (biological diversity) — the diversity of plants, animals and other living organisms in all their forms and levels of organization, including the diversity of genes, species and ecosystems, as well as the evolutionary and functional processes that link them.

Conservation — the planning, management and implementation of an activity with the objective of protecting the essential physical, chemical and biological characteristics of the environment against degradation.

Critical wildlife zones — areas that are considered important to maintain for wildlife habitat and/or the protective aspects of these areas. The majority of these are ungulate winter ranges, primarily associated with river valleys that provide thermal cover and food.

Debris disposal — the total or partial disposal of unsalvageable timber, brush, roots and other woody debris.

Degradation (soil) — the changing of a soil to a condition less capable of supporting the various desired uses. This process can occur through wind and water erosion, salinization, organic matter depletion, acidification and compaction. The results include loss of organic matter content, change in organic matter quantity and quality, changes in soil texture or aggregation, loss of tilth, and changes in moisture-holding capacity.

Disposition — means for the purpose of this Handbook, every instrument (e.g., lease, licence or permit) executed under the referenced legislation.

Economic species — species of economic importance (e.g., fur-bearing species that are trapped and game species that can be hunted with the aid of licensed guides and outfitters).

Ecosite — fine-scale ecological units that develop under similar environmental influences, and have a relatively uniform parent material, soil, hydrology, and microclimate. Ecosites are functionally defined

on the basis of moisture and nutrient regimes, and each ecosite consists of groups of one or more ecosite phases that occur within a similar range of moisture and nutrient regimes.

Environment — the interacting natural systems and components of the earth; includes air, land and water, and all organic and inorganic matter and organisms (e.g., fish and wildlife).

Equivalent land capability — the ability of the land to support various land uses after conservation and reclamation will be similar to the ability that existed prior to an activity being conducted on the land, but the individual land uses will not necessarily be identical.

Erosion — wearing away of the land surface by running water, wind, ice, other geological agents, activities of man or animals, and including such processes as gravitational creep. Erosion may either be normal or accelerated; the latter is brought about by changes in the natural cover or ground conditions, including those resulting from human activity.

Extraction — dig up and remove resources that are then used for specific purposes.

Final reclamation — entails the following: removal of equipment, structures or associated facilities; decontamination of structures or other associated facilities, or of the land or water; stabilizing, contouring, conditioning, or reconstructing and revegetating of the surface of the land; and any other procedure, operation or requirement specified in applicable legislation.

Fish — includes species harvested for domestic, recreational and commercial purposes, and species of management concern, and includes parts of fish, eggs, sperm, spawn, and juvenile stages of fish.

Fish habitat — those parts of the environment on which fish depend, directly or indirectly, in order to carry out their life processes. Fish habitat includes the water, water quality and aquatic life in rivers, lakes, streams and oceans, as well as the total surroundings of these waterbodies, including plants and other life forms that interact to make fish life possible.

Fish species and associated habitats of management concern — individual species of fish that have an identifiable value (social, economic or environmental), and their habitats that are managed to ensure their protection, continued viability and/or use.

Forest land use zones — an area to which legislative controls are applied to solve specific land use problems in the Green Area. These are established under the *Forests Act* and can be used to protect areas containing sensitive resources such as wildlife and their habitats, vegetation, soils or watersheds or they can be used to separate or control conflicting recreational activities.

Forest management agreement areas — large, continuous blocks of provincial public land in the Green Area that have been allocated to a forest company primarily for timber management.

Free-to-grow — a crop tree that has achieved the minimum height requirements and is free of competitor trees and shrubs as defined in the Alberta standards for the type of survey and tree species.

Grubbing — mixing, removal and storage (stockpile or windrow) of both the mineral soil layer and organic duff layer (e.g., moss, leaf litter, grass mat, and roots) from a site after clearing.

Hazard reduction burning — vegetation control method using fire to control heavy vegetative growth where deemed necessary along rights-of-way (e.g., roads and railways)

Hazardous waste — any waste, or combination of wastes, that pose a substantial present or potential hazard to human health or living organisms because such wastes are non-degradable or persistent in nature, or because they can be biologically magnified, or because they can be lethal, or because they otherwise cause or tend to cause detrimental cumulative effects. (*Refer to the Alberta Users Guide for Waste Managers for a listing of hazardous wastes under EPEA*).

Industrial/commercial surface access — this form of access is related specifically to linear developments that may have the potential to increase and change accessibility and use of an area through operational/developmental activities (e.g., clearing, site preparation, ongoing operations).

Infrastructure maintenance — any minor maintenance that is performed to preserve structural integrity, safety and design functionality of the infrastructure (e.g., roads, culverts/bridges, ditches).

Integrated Resource Plans — Cabinet-approved policy documents that provide broad direction on land and resource management and use. They establish guidelines for allowable activities within specific areas and outline surface access restrictions.

Intragravular flow — the water moving through the substrate pore of a streambed.

Lake management plans — plans developed to protect the recreational value of land around specific lakes in the province.

Land — includes terrestrial, semi-aquatic and aquatic landscapes when the term is used in the definitions of "land capability" and "equivalent land capability".

Land capability — the ability of land (unaltered by future management inputs, activities, or alterations) to support a given land use, based on an evaluation of the physical, chemical and biological characteristics of the land, including topography, drainage, hydrology, soils and vegetation.

Land maintenance — any upkeep (e.g., erosion control, revegetation, and minor reclamation) to the land that is carried out to maintain the area to Alberta Environment standards following progressive reclamation.

Land Manager — A departmental officer or officers, with delegated authority under the *Public Lands Act*, or an Inspector under the *Mines and Minerals Act, Part 8*. The land manager makes the final decision regarding the use of Public Land. Some Land Managers are also appointed as Conservation and Reclamation Inspectors to administer the conservation and reclamation requirements under the *Environmental Protection and Enhancement Act* (*EPEA*).

Land treatment — the controlled application of a substance on the soil surface, and incorporation of the substance into the upper soil zone, in such a manner that physical, chemical, or biological degradation of the substance takes place.

Lifts — the actual soil layers, often grouped according to structure and texture that are removed from the ground or surface of the area to be disturbed.

Manual cutting — the practise of limbing, felling, bucking of woody debris to minimize fire hazard, assist in erosion control or promote decomposition.

Mechanical vegetation control — the removal or reduction of vegetation by mechanical means.

Migration (fish) — the movement of fish to and between critical habitats is essential to enable fish to carry out their life processes and maintain the long-term viability of populations. Depending on the species and population, these movements occur at different life cycle stages and may occur on a daily, seasonal, annual or longer term, basis.

Mitigation — mitigation includes actions taken during the planning, design, construction and operation of a project to alleviate potential adverse effects on the productive capacity of fish habitats. Mitigation includes measures undertaken to maintain habitat or prevent residual damage to habitat (e.g., timing of construction, sediment control plans, minimize instream construction activity).

Native landscapes — a landscape that contains assemblages of plants and plant communities that are, indigenous to a particular region.

Native species — plant species that are indigenous to a particular region.

Non-indigenous species — species that now occur in an area but did not originate in that area. These species have been introduced into an area by accidental or planned human intervention.

Oilfield waste — any unwanted substance or mixture of substances that results from the construction, operation, or reclamation of a wellsite, oil and gas battery, gas plant, compressor station, crude oil terminal, pipeline, gas gathering system, oil production site, or oilfield waste related facility.

Organic matter content — the decayed remains of plants and animals, and complex substances synthesized by soil organisms.

Parks and protected areas — areas within Alberta that have been specially designated under the *Provincial Parks Act, Wilderness Areas, Ecological Reserves, and Natural Areas Act and the Willmore Wilderness Park Act* (e.g., heritage rangeland natural areas, natural areas, provincial parks, wildland provincial parks, provincial recreation areas, wilderness areas, and ecological reserves.)

Partial debris disposal — altering the slash and woody debris at the site by manual cutting and using mechanical implements. It may also involve burning a limited portion of the woody debris.

Permanent sample plots/industrial sample plots — plots that have been established to research, measure, evaluate, and compile data on forest growth. Many of these plots existed for over 20 years, and their continued maintenance and existence is very desirable and invaluable to the program.

Permeability — the ease with which water penetrates a bulk mass of soil or a layer of soil.

Pesticide — a substance that is intended, sold or represented for use in preventing, destroying, repelling or mitigating any insect, nematode, rodent, predatory animal, parasite, bacteria, fungus, weed or other form of plant or animal life or virus, except a virus, parasite, bacteria, or fungus in living people or animals. Includes any substance that is a plant growth regulator, a defoliant, or a plant desiccant. (Note: the term includes herbicides and insecticides.)

Pit — an excavation in the surface made for the purpose of removing, opening up, or proving sand, gravel, clay, marl, peat, or any other substance, and includes any associated infrastructure but does not include a mine, quarry, or borrow excavation.

Prescribed burning — the use of fire under controlled circumstances to alleviate heavy accumulations of litter, and to control brush invasion.

Productive capacity — the natural capacity of habitats that comprise the aquatic environment to produce healthy fish that are safe for human consumption, or to support or produce the naturally occurring diversity of aquatic organisms upon which fish depend.

Progressive reclamation — any interim or concurrent reclamation of land undertaken during, following or in connection with construction/development and ongoing operations for an active disposition.

Quarry — any opening, excavation, or working of the surface or subsurface for the purpose of working, recovering, opening up or proving ammonite shell or any mineral other than coal, a coal-bearing substance, oil sands, or an oil sands-bearing substance, and includes any associated infrastructure.

Rare species and rare plant communities — individual species and plant communities that are included on the most recent Alberta Natural Heritage Information Centre (ANHIC) provincial tracking lists for plants, plant communities and animals. These are typically species or communities that are ranked S1 (1-5 occurrences), S2 (6-20 occurrences) and in some cases, S3 (21-200 occurrences).

Recreational species — species of recreational importance (e.g., hunting/fishing, viewing, photography).

Reservation — an identification code placed on land to identify features worthy of special consideration when industrial and other operations are contemplated.

Resource Manager — The resource manager (e.g., fisheries, wildlife) provides recommendations to the Land Manager based on technical and scientific information, and has overall responsibility for managing sustainability of the resource.

Restoration — the process of restoring site conditions to a state similar to that, which existed before the land disturbance.

Rollback/debris spreading — the practise of re-spreading woody debris from windrows and brush piles back over the site after completion of the activity.

Sediment — solid material, both mineral and organic, that is in suspension, being transported, or has been moved from its surface of origin by air, water, gravity or ice. Sedimentation is the process whereby soil particles, detached through erosion, are deposited.

Sensitive species — species that are known to be particularly sensitive to, or intolerant of, industrial/commercial land use activities (e.g., grizzly bear, colonial-nesting birds), or species that depend on unique and sensitive habitats (e.g., old growth forests and wetlands).

Slope modification — altering the slope angle to decrease erosion potential.

Soil degradation — the changing of a soil to a condition less capable of supporting the various desired uses. This can occur through wind and water erosion, salinization, organic matter depletion, acidification and compaction. The results include changes in organic matter quantity and quality, changes in soil texture or aggregation, loss of tilth and changes in moisture-holding capacity.

Soil horizons — a layer of mineral or organic soil or soil material approximately parallel to the land surface that has characteristics altered by processes of soil formation. It differs from adjacent horizons in colour, structure, texture and consistency, and in chemical, biological, and mineralogical composition. The major soil horizons are A, B and C. The major organic horizons are L, F and H (mainly forest litter at various stages of decomposition) and O (derived mainly from bogs, marsh, or swamp vegetation). The LFH layer (duff layer) is found in forested soils on top of the A-horizon.

- A-horizon: generally considered to be the topsoil and is typically darker in colour than the B and C-horizons. The soils also exhibit finer structures and contain more organic materials. This horizon contains most of the nutrients and water.
- B and C-horizons: the subsoil that occurs under the A-horizon. The soils are often lighter and brighter in colour than topsoil and often have a heavier, coarser texture than A-horizons. B-horizon is a mineral horizon characterized by enrichment in organic matter, sesquioxides, or clay; or by the development of soil structure; or by a change in colour denoting hydrolysis, reduction or oxidation. C-horizon is a mineral horizon comparatively unaffected by the pedogenic processes occurring in A and B.
- The root zone for most plants is considered to be the upper 1.2m (often all the A and B-horizons and some of the C-horizon).

Soil salvage methods — three soil salvage methods: one-lift, two-lift and three-lift.

- One-lift salvage: commonly used in the Green Area, forested areas of the White Area, and in muskeg areas. A common depth for stripping forest soils is down to 15cm. Muskeg or organic soils usually go to a depth of 30 – 40cm.
- Two-lift salvage: commonly used throughout the White Area where agricultural activity dictates the soil handling techniques, and where soil horizons can be more easily recognized. The A-horizon is removed first followed by the second lift B-horizon.
- Three-lift salvage: less common, and is used primarily when there is a definite distinction in quality between the upper subsoil and lower subsoil horizons.

Soil stripping — the mechanical removal and storage (stockpile or windrow) of specific mineral soil layers from a site.

Solid waste — any material, product or by-product for which the generator has no further use, that is discarded for management at waste disposal facilities. The definition excludes wastes that are associated with primary resource extraction or harvesting, conventional air pollutants and liquid effluents that may be discharged from processing or manufacturing sites, waste sludge from the treatment of municipal sewage, soil as a result of contaminated site clean-up programs, and by-products generically called nuclear and hazardous wastes.

Special Areas Board — provincial public lands within Special Areas, which is a large block of land in southeast Alberta that was once freehold land. Authority to occupy and use this land must come from the Special Areas Board.

Species of domestic, recreational and commercial importance — includes species used for food by Alberta's aboriginal people, for sport fishing and for commercial fishing.

Species of management concern — includes fish species classified as species at serious risk, threatened with extirpation (COSEWIC), vulnerable species or species of special concern (SRD).

Sterilization of the resource — construction of permanent or long-term developments on top of aggregate deposits.

Structural method (erosion control) — the use of earthen dikes, gabion baskets, rock armouring and interceptor/diversion ditches, constructed alone or in combination, to isolate or divert water away from areas that are actively eroding or have a high potential for erosion.

Subsoil — the B and C-horizon soil material found beneath the topsoil.

Surface materials — sand, gravel, clay, peat, marl, silt, and topsoil deposited on the earth's surface, having a depositional history that is not associated with the bedrock formation.

Suspended sediment — sediment (mainly clays and silts) that is transported through the buoyancy and drag forces of flowing water and that stays in suspension for a period of time.

Tackifier method (erosion control) — a substance, that when combined with organic material, water, seed and fertilizer and sprayed onto the exposed soil surface, forms a protective layer over the soil that resists erosion and reduces runoff velocity.

Temporary controls — control measures that are of short-to-medium term duration, lasting until permanent controls are established.

Tilth — the physical state of the soil that determines its suitability for plant growth taking into account texture, structure, consistence and pore space. It is a subjective estimation based on experience.

Topsoil — the uppermost part of the soil, ordinarily moved in tillage, or its equivalent in uncultivated soils (A-horizon). Comprises all "A" horizon (Ah, Ahe, Ae, and Ap) material within the surface profile, including any overlying organic horizons (O, L, F and H).

Total debris disposal — the complete removal and disposal of trees and brush at the site by burning, with the residue spread out over the disturbed areas.

Trumpeter swan lakes — trumpeter swans are listed under the *Wildlife Act* as an endangered species. A surface disturbance of any type near these sites may cause the birds to relocate, leaving their preferred habitat; therefore, Trumpeter Swan lakes and waterbodies have required buffers for different activities, and summer activities (April 1 to July 15) are restricted.

Vacant (unoccupied) public lands — public lands that are not held under disposition or reservation.

Vegetation management — the selective removal and/or control of vegetative growth (e.g., trees, shrubs, grass, herbs, and weeds) for the following purposes: fire control and wildfire protection, noxious weed control, safety, access, aesthetics, range improvement, ensuring the integrity of the native plant communities, and maintaining functionality of industrial/commercial facilities.

Vegetative method (erosion control) — method for controlling erosion, either temporarily or permanently, by establishing acceptable vegetation growth.

Waste — any solid or liquid material or product or combination thereof, including but not limited to, rubbish, refuse, garbage, paper, packaging, containers, bottles, cans, manure, human or animal excrement, sewage, or the whole or part of an animal carcass, or the whole or part of any article, raw or processed material, vehicle or other machinery that is disposed of.

Waste management — the process of handling, treating and directing waste generated at source through to its final destination.

Waterbody — any location where water flows or is present, whether or not the flow or the presence of water is continuous, intermittent or occurs only during a flood, and includes but is not limited to wetlands and aquifers.

Water source areas — that portion of a watershed where soils are water saturated or surface flow is occurring and contributes directly into a watercourse (e.g., springs or seeps).

Watercourse — a river, brook, stream or other natural water channel (includes ephemeral draws), and the bed along which water flows.

Watershed — all lands enclosed by a continuous hydrologic-surface drainage divide and lying upslope from a specified point on a stream. A watershed is an area of sloping land surrounded by ridges and drained by a watercourse. It collects rainfall and snowmelt and delivers it to a single outlet. A watershed can be a small area draining into a creek or a large area draining into a river. A drainage basin (e.g., North Saskatchewan River Drainage Basin) is an example of a large drainage area that comprises of a number of interconnected watersheds (sub-basins).

Wildlife — all wild species and their habitats including plants, invertebrates, and micro-organisms, as well as fishes, amphibians, reptiles, and the birds and mammals traditionally regarded as wildlife.

Wildlife habitat — the terrestrial and aquatic environments and associated ecosystem elements that in combination provide the requirements of food, cover and space needed to support self-sustaining populations of wildlife.

Wildlife sanctuaries — designed as protected sites under the *Wildlife Act*. In addition to prohibiting hunting, restrictions are placed on other activities in these areas.

Wildlife species and plant communities of management concern — individual species of wildlife and plant communities that have an identifiable value (e.g., social, economic or environmental), and are managed to ensure their protection and/or sustainability of use.

Windrowing — the practice of forming linear piles of woody debris from land clearing operations. It is a common method of partial debris disposal that is used mainly in seismic operations.

Woody debris disposal — the total or partial disposal of unsalvageable timber, brush, roots and other woody debris. It is mainly required to reduce fire hazard, but may also be necessary for aesthetic reasons where there is the potential or existence of recreational development.

APPENDIX 2. DISPOSITIONS AND LEGISLATION

Dispositions Under the Public Lands Act

Surface dispositions are issued for the use of public lands in Alberta, and all dispositions include a set of administrative and operating conditions to ensure acceptable use of the land. Disposition fees are assessed using the Schedule of Charges for Public Land Dispositions. Forms to use when applying for surface dispositions are found in the Public Lands and Forests Division (PLFD) website at http://www3.gov.ab.ca/srd/land/fp_managing.html.

Recreational Use of Vacant Public Lands

Before planning a recreational activity on vacant (unoccupied) public land, contact the regional or Area office of SRD for information on existing restrictions or application requirements. In most cases, recreational activities (e.g., camping, hiking, and canoeing) on vacant public lands do not require authorization if the use is short term and non-intensive; however, there may be exceptions.

Recreational use requires the land to be used in its natural state, and still be in that same state when the activity has been completed. The surface of the land cannot be altered or damaged, which means buildings, improvements or excavations are prohibited, waste materials cannot be dumped, and trees cannot be removed without previous authorization.

Temporary Field Authorization (TFA)

Temporary field authorizations grant temporary approval under a specific set of criteria and conditions (as identified in the Temporary Field Authorization Manual) for a specific period of time. TFAs are not issued in place of dispositions.

Orders in Council

Orders in Council (OC) are passed by the Provincial Cabinet to establish land designations. For example, a Provincial Recreation Area (PRA) is established by OC through the *Provincial Parks Act*. Land within a PRA is then managed under the *Provincial Parks Act*, and Alberta Community Development must be consulted on any proposed industrial operations within the PRA. This criteria also applies to Natural Areas, Ecological Areas and other land designated through an OC.

Reservations/Notations

Reservations or notations may be placed on land or resources that are managed to achieve particular objectives. In addition to placing the land/resource under reservation, the agency that placed the reservation is also listed. The allowable land uses may be included, along with management guidelines for integrating different uses of the land. Before operations are allowed, each reservation or notations must be reviewed and in most cases they must be cleared with the agency that placed it. In some cases, special operating conditions may be necessary, or the proposed operation must be revised or diverted around the specific resource or land parcel.

Common Dispositions/Reservations/Authorities

The more common types issued under the *Public Lands Act* are described below. All dispositions are issued by PLFD unless noted otherwise.

Commercial Trail Riding Permit

Permits are issued by SRD area offices to businesses that provide commercial recreational horseback trail riding trips. The maximum term is 1 year.

Miscellaneous Leases are issued by PLFD to commercial trail riding operators for establishing a base camp in a single operator trail ride management area. The maximum term is 5 years.

Consultative Notation (CNT)

A CNT indicates that a government agency wants to be consulted before any commitment or disposition is placed on the land. The agency can request that special conditions be placed on the proposed disposition.

Consultative Notation Company (CNC)

A CNC is used to record the interest of a non-government organization or agency (NGO) in the land. Normally the NGO wants to be consulted before any commitment or disposition is placed on the land, but has no authority to reject the proposal or have conditions added to the approval. An example of where a CNC might apply is for the holder of a surface disposition who may be considering expansion in the future (e.g., expansion of a plant site), and who may have concerns with other proposed surface dispositions in the area.

Cultivation Permit (CUP)

Cultivation permits are issued annually to allow cropping of land already under cultivation.

Designated Historic Resource (DHR)

A DHR is used to designate sites under the *Historical Resources Act*. These include historic sites, archaeological resources, paleontological resources, and natural history resources. The DHR recognizes the significance of an historic resource and provides legal protection for it.

Disposition Reservation (DRS)

Disposition reservations permit a government agency to use and develop public land for a specific purpose, such as sand and gravel extraction or irrigation headworks. The potential land use applicant must obtain consent from the DRS holder. The term of the licence varies depending on the purpose.

EASEMENT (EZE)

Easements are generally issued to power companies for power line rights-of-way. They may also be issued for access to private land. The term of the licence varies depending on the purpose.

ECOLOGICAL RESERVE AREA BY ORDER IN COUNCIL (ERR)

An ERR identifies a site that has been designated as an Ecological Reserve by an Order in Council. No other activities can occur on the site unless a management plan has been developed that allows specific activities.

FARM DEVELOPMENT LEASE (FDL)

Farm development leases may be issued for agricultural public land the department does not wish to sell owing to possible resource conflicts, conservation needs, erosion concerns, or other reasons. The maximum term is 10 years (renewable).

FOREST GRAZING LICENCE (FGL)

A forest grazing licence may be issued for livestock grazing on forested public lands for a term of up to 10 years. Public lands held under an FGL within a FMA remain part of that management area and are subject to the management plan of the FMA holder. Grazing within an FMA can only be authorized under a licence.

FOREST RESERVES PERMIT (FRP)

Under the authority of the *Forest Reserves Act*, forest reserve permits are issued by an SRD Area office for livestock grazing on forested public lands within the Rocky Mountains Forest Reserve.

GRAZING LEASE (GRL)

Grazing leases are usually issued for a term of 10 years where grazing is considered the best long-term use of the land.

GRAZING/HAY PERMIT (GRP/HAP)

Grazing permits are issued on land reserved for other purposes, or when it is not considered in the public interest to grant long-term dispositions on specific land. These permits may be considered for renewal. Hay permits are issued annually for the haying season only.

HOLDING RESERVATION (HRS)

An HRS indicates that a government agency has identified a specific future use of the land based on an approved development plan or policy decision by senior management.

INDUSTRIAL SAMPLE PLOT (ISP)

An ISP shows that a forest industry company has an interest in an area that contains a permanent sample/research plot within their FMA. No disturbance of this area is permitted.

NATURAL AREAS BY ORDER IN COUNCIL (NAA)

An NAA identifies land that has been designated as a Natural Area by Order in Council. No other activities can occur on the site unless a management plan has been developed that allows specific uses.

LICENCE OF OCCUPATION (LOC)

Licences of Occupation grant the right to occupy public lands for an approved purpose, and may be subject to other dispositions granted for the same area. They are issued primarily for access roads, but may also be issued for other purposes (e.g., water intake/outfall sites, pier sites, airstrips, reservoirs). The LOC does not grant any other right to the land. The term of the licence varies depending on the purpose.

When an LOC is issued for a commercial roadway, the LOC holder must give permission for another commercial user to use the road. If agreement cannot be reached, the commercial user may apply to PLFD for an Order under the *Public Lands* Act (*Dispositions and Fees Regulation*). Unless these roads are closed through the access management process, the public (non-commercial) can use them without charge.

MINERAL SURFACE LEASE (MSL)

Mineral surface leases issued to mineral producers (someone who has the rights to the mineral resource or has the right to work the minerals) grant exclusive surface rights for surface mining and quarries, wellsites for oil and gas extraction, heavy oil/in situ oil sands and battery sites, or for other purposes incidental to the recovery and production of minerals. The maximum term is 25 years (renewable).

MISCELLANEOUS LEASE (MLL)

Miscellaneous leases may be issued for a variety of purposes that are not specifically covered by regulations under the *Public Lands Act* (e.g., commercial site, refinery, processing plant, mill, plant site). MLLs are normally issued for 10 years, with the maximum term being 25 years (renewable).

MISCELLANEOUS PERMIT (MLP)

Miscellaneous permits are issued for a variety of purposes that are not specifically covered by regulations under the *Public Lands Act* (e.g., industrial campsites) but are for short-term use (1 year maximum). If the land continues to be used for the purpose stated in the MLP after three years, the permit may be converted to an MLL based on recommendation of the appropriate Area Land Manager.

PIPELINE AGREEMENT (PLA)

Pipeline agreements authorize construction of a pipeline or flowline within the right-of-way, and construction of right-of-way installations incidental to the pipeline (e.g., valve, valve box, connection, foundation). The agreement may remain in effect for as long as required.

PIPELINE INSTALLATION LEASE (PIL)

Pipeline installation leases grant exclusive surface rights for surface right-of-way installations (generally off the right-of-way) that are incidental to pipeline operation (e.g., pumping station, compressor site, metering facility). The maximum term is 25 years (renewable).

PROTECTIVE NOTATION (PNT)

A PNT places a land use restriction on the land, usually owing to specific natural features. Such features may include any naturally occurring characteristics related to land form or soil type, or vegetative characteristics. A PNT may reflect either an indefinite land use restriction, or a restriction that may change over time owing to changing vegetative characteristics.

RECREATIONAL LEASE (RE)

Recreational leases are issued to municipalities and societies incorporated under the *Societies Act*.

RURAL ELECTRIFICATION ASSOCIATION EASEMENT (REA)

Rural Electrification Association easements are issued to local electrification associations for constructing and maintaining rural power lines on public lands.

SURFACE MATERIAL EXPLORATION (SME)

Surface materials exploration permits are issued for exploration of surface materials (e.g., gravel, sand, silt, clay, marl, topsoil, peat). The permit conveys exclusive rights to all surface materials within the area of exploration up to a maximum of 640 ac. The maximum term is 90 days.

SURFACE MATERIALS LEASE (SML)

Surface materials leases are issued for surface excavation and extracting surface materials (e.g., gravel, sand, silt, clay, marl, topsoil, peat) and grant the right to occupy public lands. SMLs are normally issued for 10 years, with the maximum term being 25 years.

SURFACE MATERIALS LICENCE (SMC)

Surface materials licences are issued for removal of a specified quantity of surface material (e.g., gravel, sand, silt, sand, clay, marl, topsoil, peat) from public lands. The maximum term is one year.

VEGETATION CONTROL EASEMENT (VCE)

Vegetation control easements are mainly issued to power companies for controlling vegetation along a strip of public land adjacent to power line rights-of-way.

Dispositions Under the Forests Act

SRD reviews and approves new timber dispositions, renewals, or assignments of FMAs and export permits. It also reviews and approves quota, licence and permit renewals or assignments that have development implications. Unless noted otherwise, all dispositions are issued by the PLFD.

Under the *Forests Act*, Crown timber may be disposed of under an FMA through timber permits, timber quota certificates, and through timber licences to timber quota holders. A quota, licence or permit does not convey any legal right or interest in the land. The more common types of dispositions are described below.

FOREST MANAGEMENT AGREEMENT (FMA)

Forest management agreements give a timber company the timber rights to specified tracts of forested public lands in the Green Area. Through the FMA, the company has the right to establish, grow and harvest timber on a perpetual sustained-yield basis for a specified period of time. As part of the agreement, the company agrees to construct a wood processing facility (or operate an existing facility), and manage the area according to forest management principles approved by PLFD.

The agreement specifies that other land uses must be allowed on the FMA, including oil and gas exploration and development, and mineral and surface materials exploration and development. Consent must first be obtained from the FMA holder when access is required to carry out these other activities. The FMA holder may require special operating conditions as part of the consent, and is entitled to reasonable compensation for loss or damage to timber or improvements.

Note: Consent is not required to carry out geophysical exploration activities within an FMA. However, the exploration company must notify the FMA holder of the proposed activity.

TIMBER QUOTAS/ALLOCATIONS

A timber quota is a percentage of the annual allowable cut for a specific forest management unit. Periodically, this percentage is converted to a volume of roundwood at the same levels of use established for the management unit. Where merchantable timber is available for cutting in commercial quantities from permanent forested land, PLFD specifies the amount that may be cut annually on a sustained-yield basis. When an annual allowable cut has been established for a forest management unit, both coniferous and deciduous timber quotas may be allocated for a maximum term of 20 years.

TIMBER LICENCE

A timber licence can be issued for either coniferous timber (CTL) or deciduous timber (DTL). It authorizes the harvest of predominantly one species group, with minor volumes of another species group. Timber licences contain special conditions that must be followed by the quota holder.

COMMERCIAL TIMBER PERMIT (CTP)

A commercial timber permit is a short-term, area-based timber disposition that authorizes the cutting of Crown timber under section 22 of the *Forests Act*.

LOCAL TIMBER PERMITS (LTP)

A local timber permit is a short-term disposition issued primarily to local residents for cutting up to 50 m^3 of green roundwood for personal or other non-commercial use, but not for sale. LTPs are also issued for cutting a designated volume of timber that is endangered by acts of nature, or to remove a volume of decked salvage roundwood timber or cut a specific number of trees that are 10 m in height or less.

Authorities Under Other Acts and Their Regulations

COAL/OIL SAND EXPLORATION PROGRAMS

Exploration program approvals are issued by PLFD for coal and oil sand exploration activities on public lands under the *Code of Practice for Exploration Operations*, pursuant to *EPEA*. The Code includes operating guidelines and outlines the information required for application and registration. The *Public Lands Act* approval includes a set of administrative and operating conditions to ensure acceptable use of the lands. Approvals are issued for one year; time extensions and amendments may be approved as appropriate.

EXPLORATION PROGRAM APPROVALS

Exploration program approvals are issued by PLFD for oil and gas exploration on both private and public lands under the *Exploration Regulation* (*Part 10* of the *Mines and Minerals Act*). All authorizations include a set of administrative and operating conditions to ensure acceptable use of the land (e.g., minimal surface disturbance, appropriate disposal of waste and satisfactory reclamation).

- All exploration activity carried out in Alberta must be approved under an exploration licence.
- A company must have an exploration licence before it can obtain an exploration approval.
- An exploration permit is required for a company to operate exploration equipment.
- All approvals issued under the *Exploration Regulation* expire April 30 of each year.

METALLIC AND INDUSTRIAL MINERAL EXPLORATION PROGRAM APPROVAL

Exploration approvals are issued by PLFD for metallic and industrial mineral exploration on both public and private land under the *Metallic and Industrial Minerals Exploration Regulation* (*Part 10* of the *Mines and Minerals Act*). All authorizations include a set of administrative and operating conditions. Prospecting using hand-held implements that cause minimal surface disturbance is exempt under the regulation, and does not require an exploration licence, permit or approval. An exploration permit is required for a company to operate exploration equipment.

- A company must have an exploration licence before it can obtain an exploration approval.
- All approvals issued under the *Metallic and Industrial Minerals Exploration Regulation* expire April 30 of each year.
- A surface disposition must be obtained if mineral resource development is proposed for public lands.

RIGHT-OF-ENTRY ORDER (ROE)

Right-of-entry orders are issued by the Surface Rights Board under the *Surface Rights Act* to authorize entry and use of both public and private lands when an access agreement cannot be reached between the commercial/industrial operator and the landowner or disposition holder.

Legislation

This section lists some of the main acts and regulations that may affect industrial/commercial activity associated with public lands. A complete listing or copies of the legislation are available from the Queen's Printer (http://www.qp.gov.ab.ca/custom_page.cfm?page_id=6):

Queen's Printer Bookstore

10611-98 Avenue, Park Plaza Building
Edmonton, AB, T5K 2P7
Telephone: 780-427-4952
Fax: 780-452-0668

602, 620 - 7th Avenue SW
John J. Bowlen Building
Calgary, Alberta T2P 0Y8
Telephone: 403-297-6251
Fax: 403-297-8450

Alberta Provincial Legislation

Agriculture, Food and Rural Development

- *Soil Conservation Act*
- *Stray Animals Act*
- *Weed Control Act*

Community Development

- *Historical Resources Act*
- *Provincial Parks Act*
  - *Dispositions Regulation*
  - *General Regulation (Provincial Parks Act)*

- *Wilderness Areas, Ecological Reserves and Natural Areas Act*
- *Willmore Wilderness Park Act*

Energy

- *Mines and Minerals Act* (part 10 administered by SRD)
  Ammonite Shell Regulation

Energy and Utilities Board

- *Energy Resources Conservation Act*
  Energy Resources Act Regulations
- *Hydro and Electric Energy Act*
- *Oil and Gas Conservation Act*
  Oil and Gas Conservation Act Regulation
- *Pipeline Act*
  Pipeline Regulation

Environment

- *Environmental Protection and Enhancement Act* (Sec. 28 to 32 is the responsibility of SRD and AENV, and Sec. 35(d) to (f.4) is the responsibility of AENV, SRD and ACD)
  Conservation and Reclamation Regulation
  Waste Control Regulation
  Code of Practice for Exploration Operations
- *Water Act*
  Water (Ministerial) Regulation
  Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body.
  Code of Practice for Watercourse Crossings.

Government Services

- *Freedom of Information and Protection of Privacy Act*
- *Land Titles Act*
- *Law of Property Act*
- *Occupational Health and Safety Act*

Health and Wellness

- *Public Health Act*

Human Resources and Employment

- *Land Agents Licensing Act*

Infrastructure

- *Public Works Act*

Municipal Affairs

- *Municipal Government Act*
- *Special Areas Act*

Sustainable Resource Development

- *Agricultural Dispositions Statutes Amendment Act* 1999 (awaiting proclamation)
- *Fisheries (Alberta) Act*
  - *Fisheries (Ministerial) Regulation*
  - *General Fisheries (Alberta) Regulation*
- *Forest and Prairie Protection Act*
- *Forests Act*
  - *Castle Special Management Area Forest Land Use Zone Regulation*
  - *Forest Land Use and Management Regulations*
  - *Forest Recreation Regulations*
  - *Timber Management Regulation*
- *Forest Reserves Act*
  - *Forest Reserves Regulation*
- *Mines and Minerals Act (part 10)*
  - *Exploration Regulation*
  - *Metallic and Industrial Minerals Exploration Regulation*
- *Natural Resources Conservation Board Act*
- *Public Lands Act*
  - *Dispositions and Fees Regulation*
- *Surface Rights Act*
- *Surveys Act* [Sec. 5(1)(d) and (2)(b) is the responsibility of SRD and Alberta Government Services]
- *Wildlife Act*
  - *Wildlife Regulation*

Transportation

- *Highway Traffic Act (responsibility of Alberta Transportation and Alberta Municipal Affairs)*
- *Off-Highways Vehicle Act*
- *Public Highways Development Act (responsibility of Alberta Transportation and Alberta Municipal Affairs)*
- *Traffic Safety Act*

Federal Government Legislation

- *Canadian Environmental Assessment Act*
- *Canadian Environmental Protection Act*
- *Fisheries Act*
- *Migratory Birds Convention Act*
- *Navigable Waters Protection Act*

APPENDIX 3. REGIONAL/LOCAL PLANNING ELEMENTS

Regional Planning Documents and Designations

The applicant is responsible for determining what specific plans or elements apply to the proposed area of operation/development, and ensuring the planning elements are addressed correctly in the application. Some of the regional planning documents or elements that may have an impact on industrial/commercial operations are described below.

- Integrated Resource Plan (IRP) — Cabinet-approved policy documents that provide broad direction on the management and use of land and natural resources in some areas of Alberta. Three types of IRPs exist: regional, sub-regional and local. (Copies of these plans may be obtained from the AENV Information Centre.
  - Regional Plans — "*A Policy for Resource Management of the Eastern Slopes, Revised 1984*" is the only approved regional plan to date. It provides a broad land use zoning scheme for the Eastern Slopes and direction for the more detailed sub-regional plans in the region.
  - Sub-Regional Plans — plans developed for most areas within the Eastern Slopes Policy boundary, as well as for a few of the other departmental administrative regions of the province. The plans provide information on the parameters for industrial/commercial development within the plan area.
  - Local Plans — Provide more detailed guidance on land use and activities for smaller areas within the management area.
- Integrated Resource Decision (RID)/Resource Management Areas (RMA) — Cover smaller areas where specific issues required resolution, and provide more detailed guidance on land use and activities within a specified area.
- Lake Management Plans — developed to protect the recreational value of land around specific lakes in the province. Copies of these plans may be obtained from the SRD Area offices where the lakes exist.
- Water Management Plans — set specific directions regarding the management of water or result in specific actions being taken.
- Access Management Plans (AMP) — completed for specific areas of the province where damage occurs on forested land from highway and off-highway vehicle use, or where conflicts exist between wildlife and vehicle use. AMPs usually designate specific trails to be used by different classes of motorized vehicles, and provide direction for industrial access in the study area. Copies of AMPs may be obtained from the SRD Area offices where operations are planned.
- Protected Areas
  - Wilderness Areas: large areas that retain their primeval character, unaffected by human influences. Visitor travel is by foot.
  - Willmore Wilderness Park: protects a significant area of the Rocky Mountains, and is managed to preserve its natural landscapes and ecological values.
  - Wildland Parks: encompass large areas of natural landscape where human development and interference with natural processes are minimized. These are similar to Willmore

Wilderness Park, and accommodate a wider range of outdoor recreation pursuits than do wilderness areas.

  - Heritage Rangeland Natural Areas: preserve ecologically significant areas that represent Alberta's native rangelands.
  - Natural Areas: protect special and sensitive natural landscapes of local and regional significance, while providing opportunities for education, nature appreciation and low-intensity recreation.
  - Provincial Recreation Areas: support a wide range of outdoor recreation pursuits in natural, modified or man-made settings.
  - Ecological Reserves: examples of functioning ecosystems protected for scientific research, education and heritage appreciation. Surface disturbance is not allowed within the reserves.
- Forest Land Use Zones — Established in the Green Area under the *Forests Act*, and are generally used to protect areas containing sensitive resources such as wildlife and habitat, vegetation, soils or watersheds, or to separate or control conflicting recreational activities.
- Forest Management Agreement Areas — large, continuous blocks of public land in the Green Area that have been allocated to a forest company for timber management.
- Special Wildlife Considerations
  - Goat and Sheep: Special operating conditions may exist in some places to protect goat and sheep areas. Contact Fish and Wildlife Division for details.
  - Caribou Areas: Caribou guidelines describe critical times of the year when access to specific areas is denied. As well, travel corridors are also delineated. The SRD Area offices in the Northern East Slopes, Northeast Boreal and Northwest Boreal Regions should be consulted regarding caribou guidelines and restrictions specific to their areas.
- Municipal Land Use Zoning — area structure plans and other similar documents are used to zone land for various uses, including industrial activities. The respective MD should be consulted regarding any applicable statutes.
- Native Land Claims — areas of the province that are under native land claims.

Local Planning Elements

The proponent is responsible for determining the specific elements that apply to their proposed area of operation/development. Examples of local planning elements that should be addressed are given below.

- Topographic Concerns — focus should be on minimizing the use of unfavourable topography. The following practices provide options to consider:
  - Use higher ground for linear development, and use existing cleared sites for any other development. This minimizes the need for additional borrow sites/areas.
  - Avoid steep slopes and slopes where slumping is evident, as well as flood plains and low, wet areas where padding/corduroy is required.
  - Minimize creek crossings. Where creek crossings are required, ensure they are properly planned, designed, installed, maintained and reclaimed. The greater the slope gradient and flow, the greater the potential for environmental damage.

- Joint Use — during project planning and design, consideration should be given to joint use of public lands with other stakeholders.
  - Existing rights-of-way and clearings: minimize clearing and timber loss on all land dispositions. Consider sharing cleared rights-of-way, existing seismic lines and other clearings.
  - Road use agreements: ensures there is minimal duplication of infrastructure, as well as minimum potential for environmental damage and timber loss.
  - Temporary access: temporary access on existing pipeline or other linear clearings may be approved for short-term use under an agreement similar to a road use agreement.
- Seasonal Concerns — all exploration and development in muskeg areas or other poorly drained areas should be done after freeze-up to minimize environmental problems (particularly creek crossings) and expedite construction. Environmental damage is minimized by using narrow, non-graded winter roads, snow or ice bridges, and/or cabled logs for creek crossings, and non-padded wellsites.
- Wildlife and Fisheries Concerns — Many areas contain particular species for which a protective strategy exists. The boundaries and restrictions for such areas must be identified so the area can be avoided if possible, or the impact can be minimized and mitigated in accordance with the protective measures for the area.

  Timing windows for activity within highly sensitive fisheries and/or wildlife areas must be identified and taken into account during project planning and design.
- Critical Wildlife
  - Critical Wildlife Zones: important to maintain for wildlife habitat and/or the protective aspects of the area. The majority of these are ungulate winter ranges, which are associated primarily with river valleys. The main strategy for protection is to minimize the amount of activity in the area.
  - Wildlife Sanctuaries: designated as protected sites under the *Wildlife Act*. Within these areas, hunting is prohibited and restrictions are placed on other activities.
  - Habitat Conservation Areas: designated for protection under the *Wildlife Act*.
  - Trumpeter Swan Lakes and waterbodies: required buffers exist for different activities. Summer activities (April 1–July 15) are further restricted, with no activity permitted within 500 m of these lakes/waterbodies, including no direct aircraft flights overhead.
  - Buffer Requirements:
    - Wellsites, roadways, pipelines, conventional seismic lines and other similar activity: 50 m
    - Low-impact seismic lines: 200 m
    - Hand-cut seismic lines: 4 m
- Watershed Concerns — disturbance in any watershed basin should be minimized, including disturbances on sloped or water source areas. Where possible, linear disturbances should be perpendicular to any slope. Properly designed creek crossings are necessary to prevent watershed deterioration, and must be installed in accordance with accepted engineering practices.
- Subdivisions — industrial activities are generally not allowed in residential subdivisions. During the planning process, development/construction and operations adjacent to

subdivision must be carefully evaluated regarding the potential impact of noise and negative visual aesthetics, and measures taken to ensure these problems are either avoided, or minimized and mitigated.

- Surface Materials — every effort should be made to avoid placing permanent or long-term developments on top or adjacent to aggregate sources. Alternative sites or routes should be considered to avoid sterilization of the resource. The location of all surface material deposits that may be required for development should be identified in advance, particularly for road construction. Land ownership and the potential for development of an extraction pit should be evaluated.
- Timber Impacts — the cumulative effect of several new wellsites drilled annually, combined with clearings for pipelines, power lines and other infrastructure, have a major adverse impact on timber production and salvage. Large-scale timber salvage operations can affect mill operations, and wood purchasing agreements may need to be adjusted accordingly.

  It is recommended that the timber industry and the oil/gas industry work together to plan an operation. This can help to reduce duplication of access routes, and is beneficial at the site-specific planning level since a timber salvage plan must be developed.

  Care should be taken to protect areas where there has been an extensive silvicultural investment, including any research sample plots (PSP/ISP). Any adverse impacts on these areas should be avoided, or minimized and mitigated.
- Proximity to Other Land Interests — the potential impact of all proposed industrial/commercial developments should be reviewed in relation to other land interests, dispositions or reservations.
- Oil and Gas Targets (subsurface) — the Alberta Energy and Utilities Board (EUB) regulates oil and gas drilling, including well licensing and oil and gas well spacing. Target areas within each quarter section are used to regulate well spacing. Standard spacing is one well per quarter section per pool or one gas well per section per pool. More wells per target site may be permitted depending on the location.
- Recreation — an acceptable buffer should exist (e.g., trees, berms) between planned industrial activities and recreation sites (including sites with recreation potential that are under reservation).
- Permanent/Industrial Sample Plots (PSP/ISP) — these plots are used for ongoing research and compilation of data on forest growth. Damage to these plots must be avoided.
- Grazing — the grazing disposition holder must be contacted for permission to enter onto the land. The disposition holder can provide important information, such as the location of any operational concerns that must be addressed (e.g., impact on cattle operation). In the case of a grazing reserve, the grazing reserve manager must be contacted before entry to obtain information on operational concerns that may affect the reserve.
- Historical Resources — archaeological, historical and cultural resource concerns must be considered during project planning and design. Historical and cultural resources are under the *Historical Resources Act*, which is administered by Alberta Community Development. The historical resources value (HRV) is based on whether the historical resource has been designated under the *Historical Resources Act*, and its level of designation.

Information can be determined from the Listing of Significant Historical Sites and Areas (by Township): Alberta Community Development
http://www.cd.gov.ab.ca/preserving/heritage/index.asp

- Historical Resource Value 1 Lands
  - Provincial historic resources and lands owned by Alberta Community Development — Under the *Historical Resources Act,* the highest level of protection is afforded to those sites that have been designated as Provincial Historic Resource(s). Sites that have been protected at this level are considered to be the most important resources recorded within the province, and have been assigned an HRV of 1 (e.g., Devil's Coulee). HRV 1 is also used to identify lands owned by Alberta Community Development for historical resources protection and promotion purposes (e.g., Head-Smashed-In Buffalo Jump, Fort George-Buckingham House). The historical resource is not to be impacted and it is unlikely that surface access would be granted to HRV 1 lands. Applicants cannot access HRV 1 lands without prior written approval from CFHRD. Any access granted would be under very stringent operating conditions.

- Historical Resource Value 2 lands
  - Registered Historic Resources — An historical resource that has been designated as a Registered Historic Resource is situated within the described land parcel. Pursuant to section 19(5) of the *Historical Resources Act*, no person shall destroy, disturb, alter, restore, or repair any historic resource or land that has been designated, or remove an historic object from a Registered Historic Resource until 90 days from the date on which notice of the proposed action was served to the Minister of Alberta Community Development, unless the Minister consents to the proposed action before the end of the 90-day period. As of May 15, 2003, there were 245 Registered Historic Resources. Most of these are historic structures located within an urban setting. Therefore, it is unlikely the presence of a Registered Historic Resource would result in any major impacts to petroleum and natural gas industry drilling and production activities.

- Historical Resource Value 3 lands
  - Significant Historic Resources — A significant historic resource that may be a candidate for designation as a Provincial Historic Resource or Registered Historic Resource is situated within the described land parcel. Pursuant to section 37(2) of the *Historical Resources Act*, a Historical Resources Impact Assessment will likely be required to determine the relationship between the proposed activity, the significant historic resource, and any other recorded and unrecorded historical resources that may be present. Depending on the results of the impact assessment, the applicant may be ordered to undertake salvage, preservation or protective measures.

    The significant historical resource is not to be impacted. Surface access may not be granted to all or portions of the described land parcel. In some instances, an HRV 3 has been used to identify relatively large historical resources management areas (HRMA) wherein extraordinary operating conditions are often applied to petroleum

and natural gas industry activities. An example includes those lands that are encompassed by the Majorville Cairn and Medicine Wheel Provincial Historic Resource HRMA. One of the extraordinary operating conditions requires that petroleum and natural gas industry related activities must not create any new stone features (e.g., stone piles, stone alignments).

- Historical Resource Value 4 lands

  Historical Resource Value 4 lands contain one or more previously recorded historical resources that require avoidance and/or the conduct of additional historical resource studies. One of the major contributions of the 4th edition of the listing involves placing approximately 5,983 HRV 4 sites onto the listing. The majority of these sites contain archaeological resources, including the archaeological remains of historic sites (e.g., St. Mary's North West Mounted Police Outpost). One of the objectives is to complete the assignment of a historical resource value to the remaining (estimated) 14,000 archaeological sites in time for implementation of the 6th edition of the listing in April 2005.

- Historical Resource Value 5 lands

  Historical Resource Value 5 lands — High Potential Lands — contain topographic characteristics that have a demonstrated high probability for the presence of historical resources (e.g., terraces, valley slopes and prairie bluffs along the Red Deer River). A Historical Resources Impact Assessment may be required to determine if the proposed activity will impact any as yet unrecorded historical resources that may be present. The largest difference between the 3rd edition of the listing and the 4th edition is the quantity of High Potential Land". Whereas 1,707 sections were assigned an HRV of 5 within the 3rd edition of the listing, 7,773 sections or portions have been assigned a HRV of 5 within the 4th edition. Although this does represent a considerable increase in the amount of lands categorized as High Potential Lands, this increase still accounts for a minor percentage of the High Potential Lands in the Province.

APPENDIX 4. REFERENCES

A Fish Conservation Strategy for Alberta, 2000 – 2005. Alberta Environment, Natural Resources Service, Fish and Wildlife Management Division.

A Guide to Surface Material Resource Extraction on Public Land. 2000. Alberta Sustainable Resource Development.

Alberta Energy and Utilities Board (EUB) regulatory documents and guides:

- IR 93-9 (Oil and Gas Developments Eastern Slopes)
- IR 90-21 (Oil and Gas Development – Rumsey block)
- IR 82-11 (Preservation of Archaelogical, Palaeontological and Historic Resources)

The Canadian System of Soil Classification. 1978. Canada Department of Agriculture.

Conservation and Reclamation Guidelines for Alberta. C&R/IL/97-1. 1997. Alberta Environment.

Environmental Operating Practices for the Upstream Petroleum Industry—Alberta Operations. May 1999. Five volumes. Canadian Association of Petroleum Producers (CAPP). (Note: these are guidelines developed by industry.)

- *Overview and Resources* – describes why and how the Environmental Operating Practices were developed, and provides a summary of management systems and regulatory processes applicable to environmental liabilities of oil and gas operations in Alberta.
- *Geophysics* – identifies environmental issues and operating practices related to seismic activities.
- *Drilling* – identifies environmental issues and operating practices related to drilling, completions and workovers.
- *Pipelines* – identifies environmental issues and operating practices related to construction and operation of any type of pipeline.
- *Production* – identifies environmental issues and operating practices for designing, constructing, operating or abandoning an oil and gas production facility.

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Fisheries-related Information Requirements for Pipeline Water Crossings by G.A. Goodchild and S. Metikosh. Can. Manuscript. Rep. Fish. Aquat. Sci. 2235: 17 pp.

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Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region.1998. Oil Sands Vegetation Reclamation Committee.

Guidelines for the Disposal of Asbestos Waste. 1983. Alberta Environment.

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Voluntary Shutdown Criteria for Construction Activity or Operations. C&R/IL/98-4. 1998. Alberta Environment.

Waste Management Information for Businesses that Store Hazardous Waste and Hazardous Recyclables. 2000. Alberta Environment.

Wastewater Management Guidelines for Alberta Sand & Gravel Operations. May 1980. Alberta Environmental Protection.

Watercourse Crossings (2nd edition). 1999. Canadian Pipeline Water Crossing Committee.